IMS ENGINEERING COLLEGE GHAZIABAD
(YEAR OF ESTABLISHMENT – 2002)
Approved by AICTE Affiliated to Dr.A.P.J.Abdul Kalam Technical University

Supporting Document

6.5.1: Internal Quality Assurance Cell (IQAC) has contributed significantly for institutionalizing the quality assurance strategies and processes

IMS ENGINEERING COLLEGE, GHAZIABAD
ELECTRICAL & ELECTRONICS ENGG. DEPARTMENT
Result Analysis of EN, 3rd yr
SUBJECT- POWER SYSTEM-I (KEE501)

Sr. No	Roll No	Name	CT-1 (30)	CT-2 (30)	TEST-3 (100)
1	1814321001	AADARSH KUSHWAHA	6	13	57
2	1814321002	AAKASH SINGH	A	24	76
3	1814321003	AAKRITI MITTAL	A	27	72
4	1814321004	ABHISHEK	A	24	70
5	1814321005	ACHINT JINDAL	A	25	76
6	1814321006	AISHWARYA ARORA	A	28	74
7	1814321007	AKASH KUSHWAH	A	26	72
8	1814321008	AKHIL BHATIA	7	Absent	77
9	1814321009	AMAN DEEP SINGH	A	16	72
10	1814321010	ANKIT KUMAR CHAURASIYA	A	20	67
11	1814321011	ASHIRWARD PANDEY	A	Absent	53
12	1814321012	DHARMENDRA KUMAR .	A	13	60
13	1814321013	DHRUV BHARADWAJ	A	26	70
14	1814321014	DHRUV RAWAT	A	25	59
15	1814321015	DIVYANSHU MISRA	A	22	77
16	1814321016	GHANESH SINGH	A	26	78
17	1814321017	HARIOM .	A	25	73
18	1814321018	HARSH PARASHAR	A	16	64
19	1814321019	HARSHIT KUMAR	8	20	69
20	1814321020	HEMANT KUMAR SINGH	A	18	43
21	1814321021	KAILASH PAL	6	12	53
22	1814321022	KISHAN KUMAR	A	20	59
23	1814321023	MANIK GAUR	A	21	47
24	1814321024	MANOJ YADAV	14	15	57
25	1814321025	MOHAMMAD JAHID	A	18	46
26	1814321026	MOHD ALBER SHAH KHAN	A	20	60
27	1814321027	PAWAN KASHYAP	0	12	30
28	1814321028	PRATHAM GUPTA	A	22	49
29	1814321029	PRIYAM CHANDRA	A	24	78
30	1814321030	PUSHPENDRA YADAV	A	23	68
31	1814321031	RIYA SINGH	A	27	63
32	1814321032	RUDRANSH CHAUDHARY	A	16	40
33	1814321033	SACHIN KUMAR YADAV	26	23	64
34	1814321034	SHIVAM RAJPUT	A	23	73
35	1814321035	SHIVAM MISHRA	15	19	61
36	1814321036	SHREYA SACHAN	A	24	75
37	1814321037	SHUBHAM DUBEY	20	25	77
38	1814321038	SIDHARTH KUMAR SINGH	A	18	56
39	1814321039	SURAJ PRAKASH	A	20	59
40	1814321041	VED PRAKASH KUMAR	A	22	77
41	1814321042	VIKRANT ANKOLA	A	10	59
42	1901430219001	SHIVAM GOEAL	A	17	53

Result Analysis	CT-1	CT-2	TEST-3
Number of Students in Section	42	42	42
Number of Students Present	9	40	42
Total Pass student	4	39	41
Pass %(≥40%)	44.40%	97.50%	97.61%
Average Marks	11.1	20.625	63.40
Highest Marks	26	28	78

10/02/21
Atul Kumar Kushwaha
(Subject Teacher)

11/02/21
Mr. Vijay Kumar
(HOD-EN)

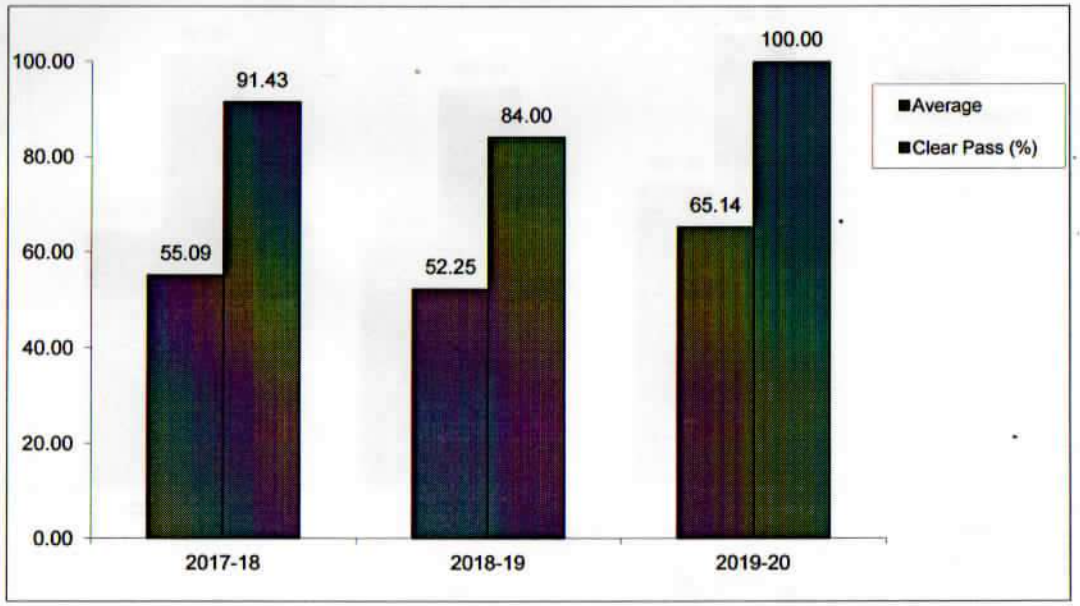
(.S ENGINEERING COLLEGE, GHAZIAL .D

Department of Electronics & Communication Engineering

Result Analysis for EC1 3rd Year Even Semester 2019-20

Subject Name	Subject Code	Session: 2017-18				Session: 2018-19				Session: 2019-20					Avg Diff. wrt 2017-18	Avg Diff. wrt 2018-19
		Students	Average	Pass %	CP	Students	Average	Pass %	CP	Students	Result Declared	Average	Pass %	CP		
INDUSTRIAL MANAGEMENT	RAS 601	35	58.74	100	0	50	55.94	100	0	35	35	66.29	100	0	7.55	10.35
CYBER SECURITY	RUC 601	N.A.				50	54.83	100	0	35	35	65.59	100	0	N.A.	10.76
CONTROL SYSTEM 1	RIC 603	35	56.89	100	0	50	49.34	90	5	35	35	66.29	100	0	9.40	16.95
MICROWAVE ENGINEERING	REC 601	35	51.86	97.14	1	50	52.37	98	1	35	35	65.80	100	0	13.94	13.43
DIGITAL COMMUNICATION	REC 602	35	50.40	97.14	1	50	52.06	90	5	35	35	60.45	100	0	10.05	8.39
ADVANCE DIGITAL DESIGN USING VERILOG	REC 064	35	58.74	100	0	50	48.97	92	4	22	22	65.00	100	0	6.26	16.03
RADAR ENGINEERING	REC 065	N.A.				N.A.				13	13	68.79	100	0	N.A.	N.A.
Overall Pass%		91.43				84				100					100.00	16.00
Class Average		55.09				52.25				65.14					65.14	12.89

Subject Name	Code	Faculty Name
INDUSTRIAL MANAGEMENT	RAS 601	Prof. Sunil Kr Pandey (ME)
CYBER SECURITY	RUC 601	Prof. Sameer Anand (EN)
CONTROL SYSTEM 1	RIC 603	Prof. Myurika Saxena
MICROWAVE ENGINEERING	REC 601	Prof. Praveen Chourasia
DIGITAL COMMUNICATION	REC 602	Prof. Balwant Singh
ADVANCE DIGITAL DESIGN USING VERILOG	REC 064	Prof. Pankaj Goel
RADAR ENGINEERING	REC 065	Prof. Arjun Singh Katiyar



(HOD, ECE) 05/08/2020

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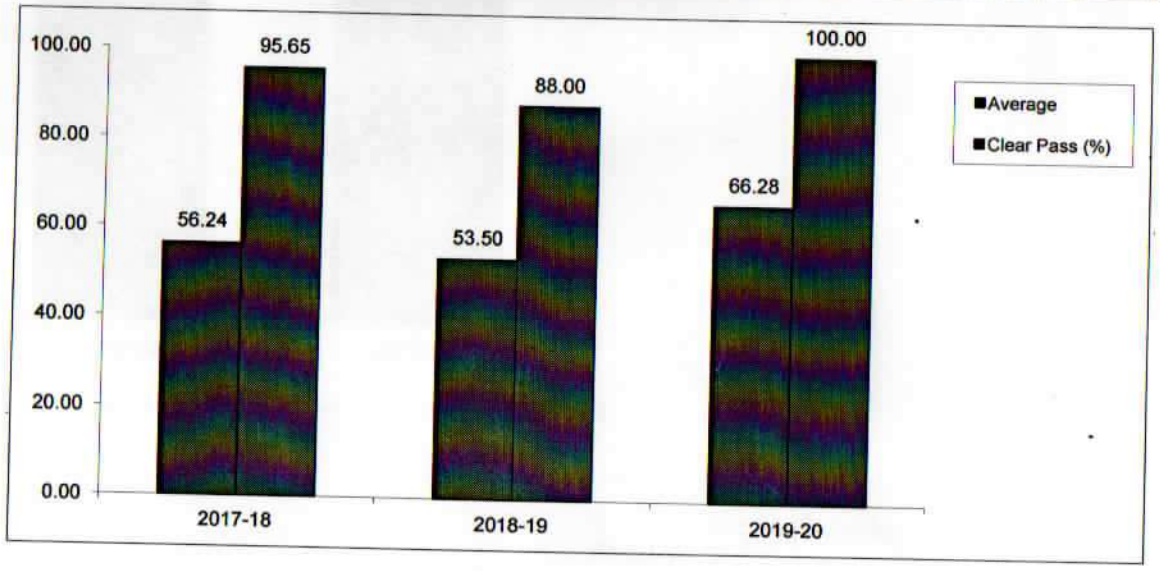
Department of Electronics & Communication Engineering

Result Analysis for EC2 3rd Year Even Semester 2019-20

Subject Name	Subject Code	Session: 2017-18				Session: 2018-19				Session: 2019-20					Avg Diff. wrt 2017-18	Avg Diff. wrt 2018-19
		Students	Average	Pass %	CP	Students	Average	Pass %	CP	Students	Result Declared	Average	Pass %	CP		
INDUSTRIAL MANAGEMENT	RAS 601	46	58.22	100	0	50	57.06	100	0	36	36	66.51	100	0	8.29	9.45
CYBER SECURITY	RUC 601	N.A.				50	58.97	100	0	36	36	66.03	100	0	N.A.	7.06
CONTROL SYSTEM 1	RIC 603	46	56.89	100	0	50	54.57	100	0	36	36	66.27	100	0	9.38	11.70
MICROWAVE ENGINEERING	REC 601	46	56.04	100	0	50	51.37	94	3	36	36	66.11	100	0	10.07	14.74
DIGITAL COMMUNICATION	REC 602	46	54.22	97.82	1	50	50.31	94	3	36	36	66.51	100	0	12.29	16.20
ADVANCE DIGITAL DESIGN USING VERILOG	REC 064	46	60.56	100	0	50	48.74	96	2	23	23	67.08	100	0	6.52	18.34
RADAR ENGINEERING	REC 065	N.A.				N.A.				13	13	64.84	100	0	N.A.	N.A.
Overall Pass%		95.65				88				100.00					4.35	12.00
Class Average		56.24				53.50				66.28					10.04	12.78

Subject Name	Code	Faculty Name
INDUSTRIAL MANAGEMENT	RAS 601	Prof. Sunil Kr Pandey (ME)
CYBER SECURITY	RUC 601	Prof. Sameer Anand (EN)
CONTROL SYSTEM 1	RIC 603	Prof. Praveen Kumar
MICROWAVE ENGINEERING	REC 601	Prof. Praveen Chourasia
DIGITAL COMMUNICATION	REC 602	Prof. Balwant Singh
ADVANCE DIGITAL DESIGN USING VERILOG	REC 064	Prof. Pankaj Goel
RADAR ENGINEERING	REC 065	Prof. Arjun Singh Katiyar

(HOD, ECE) 05/08/2020



Department of Mechanical Engineering

Result Analysis for B.Tech (EVEN SEM)ME1 2nd Year (2019-20)

Subject	Session 2017-18				Session 2018-19				Session 2019-20				Diff w.r.t 2018-19	Diff w.r.t 2017-18
	Average	Students	Pass %	CP	Average	Students	Pass %	CP	Average	Students	Pass %	CP		
KAS-402 Universal Human Values	62.68	54	100	0	55.54	34	97.058	1	62.72	51	100	0	7.18	0.04
KAS-401 Mathematics IV	52.06	54	96.3	2	51.714	34	100	0	62.54	51	100	0	10.83	10.48
KME-401 Applied Thermodynamics	51.1	54	94.4	3	38.857	34	91.17	3	62.6	51	100	0	23.74	11.5
KME-403 Manufacturing Processes	56.3	54	96.3	2	43.486	34	94.11	2	62.64	51	100	0	19.15	6.34
KME-402 Engineering Mechanics									62.52	51	100	0	NA	NA
KME-401 Measurement and Metrology	55.07	54	96.3	2	36	34	88.23	4						
KEE-409 Electrical Machines & Control	51.07	54	94.4	3	52.98	34	97	1						
Average - Class	54.71		96.28		46.42	34	94.59							
Clear Pass %	85.18%				67.64%				100.00%					

SUB. CODE	SUBJECT NAME	FACULTY NAME	AVG.	PASS %
KAS402	Maths IV	Mr. PRAVESH SRIVASTAVA	62.54	100.00
KVE401	Universal Human Values	Mr. SHIV OM SHARMA	62.72	100.00
KME401	Applied Thermodynamics	Dr. S K KALLA	62.60	100.00
KME402	Engineering Mechanics	Dr. PANKUL GOEL	62.52	100.00
KME403	Manufacturing Processes	Dr. B N PATHAK	62.64	100.00
KNC401	Computer System Security	Dr. UPASNA PANDEY		

ALL CLEAR	51
ALL CLEAR %	100.00
OVERALL AVERAGE MARKS	62.6

DEPARTMENT OF MECHANICAL ENGINEERING

Result Analysis for B.Tech ME1 3rd Year (EVEN SEMESTER) (Session 2019-20)

Subject	SESSION 2017-18				SESSION 2018-19				SESSION 2019-20				difference w.r.t 2017-18	difference w.r.t 2018-19
	Average	Students	Pass%	CP	Average %	Students	Pass%	CP	Average %	Students	Pass%	CP		
RAS601 (Industrial Management)	57.13	53	100	0	57.99	54	98.14	1	62.37	35	100	0	5.238	4.384
RUC601 (Cyber Security)					59.37	54	100	0	62.12	35	100	0	62.120	2.749
RME601(Fluid Machinery)	59.20	25	100	0	55.90	54	96.29	2	62.45	35	100	0	3.250	6.550
RME602 (Theory of Machines)	59.77	53	98	1	50.77	54	90.74	5	61.88	35	100	0	2.106	11.109
RME603 (Machine Design-II)	55.36	53	100	0	52.30	54	94.44	3	62.33	35	100	0	6.972	10.030
RME061 (RAC)	51.63	53	96.22	2	70.53	30	100	0	64.84	18	100	0	13.215	-5.689
RME062 (PPC)					52.79	24	100	0	59.83	17	100	0	59.830	7.044
NME-011 (OPTIMIZATION)	54.49	53	100	0										
NME024 (UCMP)	55.71	28	100	0										
Average - Class	56.18				57.09				62.27					
Clear Pass %	94.40%				87.03%				100.00%					

Subject Name	Average %	FACULTY
RAS601 (Industrial Management)	62.37	Dr. B. N. Pathak
RUC601 (Cyber Security)	62.12	Mr. Sumit Sharma
RME601(Fluid Machinery)	62.45	Mr. Om Prakash Umrao
RME602 (Theory of Machines)	61.88	Mr. Ajay Singh Parmar
RME603 (Machine Design-II)	62.33	Mrs. Mubina Shekh
RME061 (RAC)	64.84	Mr. Gaurav Mishra
RME062 (PPC)	59.83	Mr. Ankit Saxena

Dr. V. K. Saini
HOD,ME

DEPARTMENT OF MECHANICAL ENGINEERING

Result Analysis for B.Tech ME2 3rd Year (EVEN SEMESTER) (Session 2019-20)

Subject	SESSION 2017-18				SESSION 2018-19				SESSION 2019-20				difference	difference
	Average	Students	Pass%	CP	Average %	Students	Pass%	CP	Average %	Students	Pass%	CP	w.r.t 2017-	w.r.t 2018-
(R.A.S601 (Industrial Management)	60	56	100	0	56.66	56	100	0	63.43	35	100	0	3.429	6.770
(R.U.C601 (Cyber Security)					59.46	56	100	0	63.43	35	100	0	63.429	3.964
(RME-602(Fluid Machinery)	55	36	100	0	57.09	56	100	0	63.00	35	100	0	8.000	5.908
(RME-602 (Theory of Machines)	60.6	56	98.21	1	57.19	56	96.43	2	63.14	35	100	0	2.543	5.949
(RME603 (Machine Design-II)	48.05	56	92.85	4	57.63	56	98.21	1	63.43	35	100	0	15.379	5.801
(RME061 (RAC)	51.5	56	100	0	66.35	36	97.22	1	66.43	13	100	0	14.929	0.079
(RME062 (PPC)					50.43	20	95.00	1	61.63	21	100	0	61.629	11.200
(RME-611(OPTIMIZATION)	59.3	56	100	0										
(RME624 (UCMP)	56.5	20	100	0										
Average - Class	55.85				57.83				63.50					
Clear Pass %	92.85%				94.64%				100.00%					

Subject Name	Average %	FACULTY
(R.A.S601 (Industrial Management)	63.43	Mr. Abhishek Saxena
(R.U.C601 (Cyber Security)	63.43	Mr. Amit Pandey
(RME-602(Fluid Machinery)	63.00	Mr. Om Prakash Umrao
(RME-602 (Theory of Machines)	63.14	Mr. Ajay Singh Parmar
(RME603 (Machine Design-II)	63.43	Mrs. Sumit Sharma
(RME061 (RAC)	66.43	Mr. Gaurav Mishra
(RME062 (PPC)	61.63	Mr. Ankit Saxena

OVERALL RESULT ANALYSIS			
Academic Year	2017-18	2018-19	2019-20
Total No. of Students in IIIrd Year	104	110	70
Total No. of Students clear pass	97	100	69
Overall Clear pass %	93.27	90.91	100
Overall average marks	55.4	57.46	62.88

NOTE : Result of one student (1714340071) is not declared.

Dr. V. K. Saini
HOD,ME

Department of Mechanical Engineering

Result Analysis for B.Tech ME1 4th Year , 8th Sem. (2019-20)

Subject	Session:2017-18				Session:2018-19				Session:2019-20				Difference w.r.t 2017-2018	Difference w.r.t 2018-19
	Average	Students	Pass %	CP	Average	Students	Pass %	CP	Average	Students	Pass %	CP		
NME-801 PW plant	57.98	62	100	NIL	56.58	53	98.11	1	NA				NA	NA
NME-051/055/RME-081 OR/AWT/AW	(67.44/56.76) 62.1	25/37	100	NIL	(60.34/54.76) 57.55	21/32	100	NIL	60.39	30	100	NIL	-1.71	2.84
NME-065/062/ RME-080 PM/NDT	(61.72/60.69) 61.2	37/25	100	NIL	(56.73/56.19) 56.46	22/31	100	NIL	56.13	25	100	NIL	-5.07	-0.33
NOE-081/ROE-086 NCER/R.ENERGY	70.43	62	100	NIL	65.23	53	100	NIL	55.96	30	100	NIL	-14.47	-9.27
ROE-082/ EDP									70.83	25	100	NIL	NA	
RME-085/ TQM									63.25	48	100	NIL	NA	
RME-086/ GDP									60.48	7	100	NIL	NA	
Average - Class	62.9				58.96				61.17					
No. of Carry over				NIL								NIL		
Clear pass %	100%				100%				100%					

Subject	Faculty	Average Marks	Results not declared	Total no. of students
ROE-082	Mr Ankit Saxena	70.83	0	25
ROE-086	Mr V K Jain	55.96	0	30
RME-080	Mr Abhishek Saxena	56.13	0	25
RME-081	Dr V K Saini	60.39	0	30
RME-085	Dr Pankaj Goel	63.25	0	48
RME-086	Mr Gaurav Kumar Mishra	60.48	0	7

Dr. V.K. Saini
HOD,ME

Result Analysis for B.Tech ME2 4th Year , 8th Sem. (2019-20)

Subject	Session:2017-18				Session:2018-19				Session:2019-20				Difference w.r.t 2017-	Difference w.r.t 2018-
	Average	Students	Pass %	CP	Average	Students	Pass %	CP	Average	Students	Pass %	CP		
NME-801 PW plant	58.75	60	100	NIL	51.69	56	100	NIL	NA				NA	NA
NME-051/055/RME-081 OR/AWT/AW	(69/58.11) 63.55	24/36	100	NIL	(62.46/54.78) 58.62	25/31	100	NIL	62.48	38	100	NIL	-1.07	3.86
NME-065/062/ RME-080 PM/NDT	(65.75/56.59) 61.17	32/28	100	NIL	(57.96/53.13) 55.55	31/25	100	NIL	58.99	18	100	ABSE	-2.18	3.44
NOE-081/ROE-086 NCER/R.ENERGY	69.52	60	100	NIL	67.1	56	100	NIL	53.22	35	100	NIL	-16.30	-13.88
ROE-082/ EDP									75.07	21	100	ABSE	NA	
RME-085/ TQM									68.46	52	100	ABSE	NA	
RME-086/ GDMP									62.14	4	100		NA	
Average - Class	63.25				58.32			NIL	63.40	01 ABSENT				
No. of Carry over				NIL										
Clear pass %	100%				100%				100%					

Subject	Faculty	Average Marks	Result not declared	Total no. of students
ROE-082	Mr. Ankit Saxena	75.07	0	21
ROE-086	Mr. V. K. Jain	53.22	0	35
RME-080	Mr. Abhishek Saxena	58.99	0	18
RME-081	Dr. V. K. Saini	62.48	0	38
RME-085	Ms. Mubina Sheikh	68.46	0	52
RME-086	Mr. Gaurav Kumar Mishra	62.14	0	4

Overall Result Analysis for B.Tech ME 4th Year, even Sem. Session (2019-20)

Overall Result 4th year	2017-18	[redacted]	2019-20
Total No. of Students in 4th Year	176/177	[redacted]	111
Total No. of Students clear pass	176	[redacted]	110*
Overall Clear pass %	100%	[redacted]	100%
Overall average marks	63.09%	[redacted]	62.29%

* ONE STUDENT ABSENT

Dr. V.K. Saini
HOD,ME

ODD SEM-

DEPARTMENT OF MECHANICAL ENGINEERING

Result Analysis for B.Tech ME1 2ND Year, Odd Sem. Session (2019-20)

Subject	Session:2017-18				Session:2018-19				Session:2019-20				Diff with 17-18	Diff with 18-19	Result pending
	Average %	Students	Pass %	CP	Average %	Students	Pass %	CP	Average %	Students	Pass %	CP			
RVE 301(Human Values)	54.41	54	98.14	1	50.71	35	100	0							
KME 038(Electronics Engineering)									45.08	51	89.8	5			2
KAS301(Technical Communication)									47.63	51	97.95	1			2
ROE 033 /Laser	59.26	54	98.14	1	56.57	35	94.28	1							
RCT-303/KME 302 (Fluid Mech)	55.34	54	96.29	2	45.00	35	85.71	5	49.87	51	85.71	7	-5.47	4.87	2
RME 301/KME 303 (Material Sc)	57.86	54	100	0	45.28	35	88.57	4	48.33	51	95.92	2	-9.53	3.05	2
RME 302/ KME 301 (Thermodynamics)	53.60	54	94.44	3	49.42	35	97.14	1	44.58	51	85.71	7	-9.02	-4.84	2
RME 303/ NME 304 (SOM)	57.51	54	92.59	4	35.71	35	82.85	7							
Average - Class	56.33				47.12				47.08						
Clear pass %	85.19%				65.71%				69.38%						

Subject	Average	Faculty
RVE 301(Human Values)		
KME038(Electronics Engineering)	45.08	Mr. V K AGGARWAL
KAS301(Technical Communication)	47.63	Dr. ARVIND KR SHARMA
RCT-303/KME 302 (Fluid Mech)	49.87	Mr. A S PARMAR
RME 301/KME 303 (Material Sc)	48.33	Dr. B.N. PATHAK
RME 302/ KME 301 (Thermodynamics)	44.51	Dr. S K KALLA
RME 303/ NME 304 (SOM)		

Overall Result 2nd year	2017-18	2018-19	2018-19
Total No. of Students in IInd Year	111	70	51
Total no. of Students clear pass	96	89	34
Overall Clear pass %	86.49	62.85	69.38
Overall % average marks	56.48	48.29	47.08

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DEPARTMENT OF MECHANICAL ENGINEERING

Result Analysis for B.Tech ME2, 4th Year, Odd Sem. Session (2019-20)

Subject	Session:2017-18				Session:2018-19				Session:2019-20				Difference w.r.t 2018-19	Difference w.r.t 2017-18
	Average %	Students	Pass %	CP	Average %	Students	Pass %	CP	Average %	Students	Pass %	CP		
RCE-471/RCE-474 UHBC	58.95	60	100	Nil	58	56	100	0	57.34	56	100	NIL	-5.70	-8.30
EME/RME-432 CAM	NOT OPTED BY STUDENTS				55.62	34	97.06	1	N.A.					
RME-432 Project Mangt.	61.50	60	100	Nil	65.18	22	100	0	N.A.					
EME/RME-041 TQM	57.80	60	98	1	58.29	29	100	0	N.A.					
RME-475 Operation Research	N.A.				N.A.				58.91	27	100	NIL		
RME-044/RME078 Auto and Robot	NOT OPTED BY STUDENTS				60.37	27	100	0	56.94	29	100	NIL	-3.43	
RME-701 CAD/RME-701 CAD/CAM	58.63	60	98	1	53.93	56	96.43	2	55.09	56	100	NIL	1.16	1.46
RME-471 Power Plant	N.A.				N.A.				53.99	37	100	NIL		
RME072 Supply Chain	N.A.				N.A.				59.90	19	100	NIL		
RME-702/RME-702 Automobile Engg	58.02	60	100	Nil	55.27	56	100	0	56.77	56	100	1**	1.50	-1.25
Average - Class	57.82				57.52				56.99					
No. of Carry over				2				3				1**		
Clear pass %	96.67%				94.64%				98.21%					

1** Absent

Session:2019-20

SUBJECT	AVG.	PASS %	FACULTY NAME
RCE-471/RCE-474 UHBC	57.34	100	Mr. Shivom Sharma
RME-475 Operation Research	58.91	100	Mr. Ankit Kumar Saxena
RME-044/RME078 Auto and Robot	56.94	100	Mr. Sumit Sharma
RME-701 CAD/RME-701 CAD/CAM	55.09	100	Dr. Pankul Goel
RME-471 Power Plant	53.99	100	Dr. Pankul Goel
RME-072 Supply Chain	59.90	100	Mr. O P Umrao
RME-702/RME-702 Automobile Engg	56.77	100	Mr. V.K. Jain
CLASS AVERAGE	56.99	98.21	

Overall Result Analysis for B.Tech ME 4th Year, Odd Sem. Session (2019-20)

Overall Result 4th year	2017-18	2018-19	2019-20
Total No. of Students in IV th Year	178	164	111
Total No. of Students clear pass	174	157	108
Overall Clear pass %	97.75	95.73	97.30
Overall average marks	57.85	57.85	57.82

Dr. V.K. Saini
HOD,ME

IMS Engineering College, Ghaziabad

Department of Electrical and Electronics Engineering

From: HOD (EN)	To: All HODs

Date: 03rd Sept 2019

Now a day's almost all manufacturing industries are proceeding for automation to survive in globally competitive market to increase productivity and improve quality of products. This increases the demand of trained engineers in the field of industrial automation. In order to meet the demand of modern automated industries in terms of skilled technocrats and well trained engineers, **Department of Electrical and Electronics Engineering** has established a **Centre of Excellence, ABB Industrial Automation Centre** in C Block Room no 307.

The main aim of this Centre is to bridge the gap between the requirements of modern industries and knowledge of our graduates. This will also enhance the worth of institution in terms of providing summer training, increase in placement and interaction with industrialist. In this regard the Centre is going to organize **4 months advanced industrial automation** training from 12th September 2019. So you are requested to motivate the students to join the program and get the benefits.

Details of Training:

Duration: 4 Months

Starting date: 12th September 2019

Course Fee: Rs 20000/- per student

- Modules of training are attached with mail.

- For more details regarding registration contact to Mr Yashpal Singh, Rhythm Automation Control Pvt. Ltd. (Mobile: 9958444794) & Mr. O. P. Yadav, Assistant Professor, EN Deptt (Mobile 7557349136).

Note:

- 30% discount will be given in fee for the IMSEC students after attaining minimum 90% attendance of training.
- Students will be provided advance industrial automation training certificate by ABB.
- Final year project assistance will be provided to the students after successfully completion of training.
- **Job Assistance:** 100% job assistance will be provided to students securing 90% attendance during training. In this regard, minimum 5 interview assistance will be provided to each student in renowned company.

HOD-EN

IMS Engineering College, Ghaziabad

ABB Industrial Automation Centre (PLC/SCADA)

Advanced Training (2019-20)

S.NO	Certifict No.	Name	Duration
1	RA/TC/IMS/2020/204	Arun Datt Kaushik	12/SEPTEMBER/2019 to 12/MARCH/2020
2	RA/TC/IMS/2020/205	Kartik Sanoria	12/SEPTEMBER/2019 to 12/MARCH/2020
3	RA/TC/IMS/2020/206	Anuj Kumar Maurya	12/SEPTEMBER/2019 to 12/MARCH/2020
4	RA/TC/IMS/2020/207	**Shubham Mittal**	12/SEPTEMBER/2019 to 12/MARCH/2020
5	RA/TC/IMS/2020/208	**Prashant Shishodia**	12/SEPTEMBER/2019 to 12/MARCH/2020
6	RA/TC/IMS/2020/209	Vishesh Singh	12/SEPTEMBER/2019 to 12/MARCH/2020
7	RA/TC/IMS/2020/210	Aman	12/SEPTEMBER/2019 to 12/MARCH/2020
8	RA/TC/IMS/2020/211	Ashutosh Sharma	12/SEPTEMBER/2019 to 12/MARCH/2020
9	RA/TC/IMS/2020/212	**Rakhi Tripathi**	12/SEPTEMBER/2019 to 12/MARCH/2020
10	RA/TC/IMS/2020/213	Awantika Srivastava	12/SEPTEMBER/2019 to 12/MARCH/2020
11	RA/TC/IMS/2020/214	Sahil Khan(EC)	12/SEPTEMBER/2019 to 12/MARCH/2020
12	RA/TC/IMS/2020/215	Shashwat Srivastava(EC)	12/SEPTEMBER/2019 to 12/MARCH/2020
13	RA/TC/IMS/2020/216	**Gagan Solanki**	12/SEPTEMBER/2019 to 12/MARCH/2020
14	RA/TC/IMS/2020/217	**Satyam Shivansh(EC)**	12/SEPTEMBER/2019 to 12/MARCH/2020
15	RA/TC/IMS/2020/218	Shiv Bhushan Mishra	12/SEPTEMBER/2019 to 12/MARCH/2020
16	RA/TC/IMS/2020/219	Priyanka Gupta	12/SEPTEMBER/2019 to 12/MARCH/2020
17	RA/TC/IMS/2020/220	Prachi jain	12/SEPTEMBER/2019 to 12/MARCH/2020
18	RA/TC/IMS/2020/221	SRISHTI KAUSHIK(EC)	12/SEPTEMBER/2019 to 12/MARCH/2020
19	RA/TC/IMS/2020/222	Pradeep Kumar	12/SEPTEMBER/2019 to 12/MARCH/2020

Yashpal Singh
Rhythm Automation Control Pvt Ltd

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 08 / 10 / 2020

RA/TC/IMS/2020/204

Certificate

This is to certify that Mr./Ms. Arun Dutt Kaushik has successfully completed Industrial Automation Training during 12th September' 2019 to 12th March' 2020 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☑ DRIVES AC & DC
- ☑ INSTRUMENTATION
- ☑ DCS
- ☑ PANEL
- ☑ SWITCHGEAR
- ☑ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 08 / 10 / 2020

RA/TC/IMS/2020/205

Certificate

This is to certify that Mr./Ms. Kartik Saroria has successfully completed Industrial Automation Training during 12th September' 2019 to 12th March' 2020 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☑ DRIVES AC & DC
- ☑ INSTRUMENTATION
- ☑ DCS
- ☑ PANEL
- ☑ SWITCHGEAR
- ☑ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 08 / 10 / 2020

RA/TC/IMS/2020/206

Certificate

This is to certify that Mr./Ms. Anuj Kumar Maurya has successfully completed Industrial Automation Training during 12th September '2019 to 12th March' 2020 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☑ DRIVES AC & DC
- ☑ INSTRUMENTATION
- ☑ DCS
- ☑ PANEL
- ☑ SWITCHGEAR
- ☑ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:-08 /10 /2020

RA/TC/IMS/2020/207

Certificate

This is to certify that Mr./Ms. Shubham Mittal has successfully completed Industrial Automation Training during 12th September '2019 to 12th March '2020 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☑ DRIVES AC & DC
- ☑ INSTRUMENTATION
- ☑ DCS
- ☑ PANEL
- ☑ SWITCHGEAR
- ☑ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 08 / 10 / 2020

RA/TC/IMS/2020/208

Certificate

This is to certify that Mr./Ms. Prashant Shishodia has successfully completed Industrial Automation Training during 12th September '2019 to 12th March' 2020 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☑ DRIVES AC & DC
- ☑ INSTRUMENTATION
- ☑ DCS
- ☑ PANEL
- ☑ SWITCHGEAR
- ☑ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 08 /10 /2020

RA/TC/IMS/2020/209

Certificate

This is to certify that Mr./Ms. Vishesh Singh has successfully completed Industrial Automation Training during 12th September '2019 to 12th March '2020 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☑ DRIVES AC & DC
- ☑ INSTRUMENTATION
- ☑ DCS
- ☑ PANEL
- ☑ SWITCHGEAR
- ☑ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 08 /10 /2020

RA/TC/IMS/2020/210

Certificate

This is to certify that Mr./Ms. Aman has successfully completed Industrial Automation Training during 12th September '2019 to 12th March' 2020 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☑ DRIVES AC & DC
- ☑ INSTRUMENTATION
- ☑ DCS
- ☑ PANEL
- ☑ SWITCHGEAR
- ☑ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:-08 / 10 / 2020

RA/TC/IMS/2020/211

Certificate

This is to certify that Mr./Ms. Ashutosh Sharma has successfully completed Industrial Automation Training during 12th September '2019 to 12th March' 2020 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☑ DRIVES AC & DC
- ☑ INSTRUMENTATION
- ☑ DCS
- ☑ PANEL
- ☑ SWITCHGEAR
- ☑ NETWORKING

Director
IMSEC, Ghaziabad

Rhythm Automation Learning Centre Noida

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 08 / 10 / 2020

RA/TC/IMS/2020/212

Certificate

This is to certify that Mr./Ms. Rakhi Tripathi has successfully completed Industrial Automation Training during 12th September '2019 to 12th March '2020 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☑ DRIVES AC & DC
- ☑ INSTRUMENTATION
- ☑ DCS
- ☑ PANEL
- ☑ SWITCHGEAR
- ☑ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 08 / 10 / 2020

RA/TC/IMS/2020/213

Certificate

This is to certify that Mr./Ms. Avantika Srivastava has successfully completed Industrial Automation Training during 12th September '2019 to 12th March '2020 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☑ DRIVES AC & DC
- ☑ INSTRUMENTATION
- ☑ DCS
- ☑ PANEL
- ☑ SWITCHGEAR
- ☑ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation

ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 08 / 10 / 2020

RA/TC/IMS/2020/214

Certificate

This is to certify that Mr./Ms. Sahil Khan has successfully completed Industrial Automation Training during 12th September' 2019 to 12th March' 2020 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☑ DRIVES AC & DC
- ☑ INSTRUMENTATION
- ☑ DCS
- ☑ PANEL
- ☑ SWITCHGEAR
- ☑ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 08 / 10 / 2020

RA/TC/IMS/2020/215

Certificate

This is to certify that Mr./Ms. Shashwat Srivastava has successfully completed Industrial Automation Training during 12th September '2019 to 12th March' 2020 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☑ DRIVES AC & DC
- ☑ INSTRUMENTATION
- ☑ DCS
- ☑ PANEL
- ☑ SWITCHGEAR
- ☑ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 08 / 10 / 2020

RA/TC/IMS/2020/216

Certificate

This is to certify that Mr./Ms. Gagan Solanki has successfully completed Industrial Automation Training during 12th September '2019 to 12th March '2020 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☑ DRIVES AC & DC
- ☑ INSTRUMENTATION
- ☑ DCS
- ☑ PANEL
- ☑ SWITCHGEAR
- ☑ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 08 / 10 / 2020

RA/TC/IMS/2020/217

Certificate

This is to certify that Mr./Ms. Satyam Shivansh has successfully completed Industrial Automation Training during 12th September '2019 to 12th March '2020 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☑ DRIVES AC & DC
- ☑ INSTRUMENTATION
- ☑ DCS
- ☑ PANEL
- ☑ SWITCHGEAR
- ☑ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 08 / 10 / 2020

RA/TC/IMS/2020/218

Certificate

This is to certify that Mr./Ms. Shiv Bhushan Mishra has successfully completed Industrial Automation Training during 12th September '2019 to 12th March '2020 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☑ DRIVES AC & DC
- ☑ INSTRUMENTATION
- ☑ DCS
- ☑ PANEL
- ☑ SWITCHGEAR
- ☑ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 08 / 10 / 2020

RA/TC/ IMS/2020/219

Certificate

This is to certify that ~~Mr.~~/Ms. Priyanka Gupta has successfully completed Industrial Automation Training during 12th September '2019 to 12th March' 2020 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☑ DRIVES AC & DC
- ☑ INSTRUMENTATION
- ☑ DCS
- ☑ PANEL
- ☑ SWITCHGEAR
- ☑ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 08 /10 /2020

RA/TC/IMS/2020/220

Certificate

This is to certify that Mr./Ms. Prachi Jain has successfully completed Industrial Automation Training during 12th September '2019 to 12th March '2020 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☑ DRIVES AC & DC
- ☑ INSTRUMENTATION
- ☑ DCS
- ☑ PANEL
- ☑ SWITCHGEAR
- ☑ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 08 /10 /2020

RA/TC/IMS/2020/221

Certificate

This is to certify that Mr./Ms. Srishti Kaushik has successfully completed Industrial Automation Training during 12th September' 2019 to 12th March' 2020 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☑ DRIVES AC & DC
- ☑ INSTRUMENTATION
- ☑ DCS
- ☑ PANEL
- ☑ SWITCHGEAR
- ☑ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:-08 / 10 / 2020

RA/TC/IMS/2020/222

Certificate

This is to certify that Mr./Ms. Pradeep Kumar has successfully completed Industrial Automation Training during 12th September' 2019 to 12th March' 2020 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☑ DRIVES AC & DC
- ☑ INSTRUMENTATION
- ☑ DCS
- ☑ PANEL
- ☑ SWITCHGEAR
- ☑ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

IMS Engineering College, Ghaziabad

Department of Electrical and Electronics Engineering

From: HOD (EN)	To: All HODs

Date: 2nd May 2019

Now a day's almost all manufacturing industries are proceeding for automation to survive in globally competitive market to increase productivity and improve quality of products. This increases the demand of trained engineers in the field of industrial automation. In order to meet the demand of modern automated industries in terms of skilled technocrats and well trained engineers, **Department of Electrical and Electronics Engineering** has established a **Centre of Excellence on Industrial Automation (PLC/SCADA)** in **C Block Room no 307** in collaboration with **ABB India Ltd.**

The main aim of this Centre is to bridge the gap between the requirement of modern industries and knowledge of our graduates. This will also enhance the worth of institution in terms of providing summer training, increase in placement and interaction with industrialist.

In this regard the Centre is going to provide **4 week summer training on PLC/SCADA** as per details given below.

So you are requested to motivate the students to join **summer training program** to enhance their technical skill as well as placement opportunity.

Details of Training:

Duration: 4 Weeks

Course Contents: Attached

Course Fee: Rs 5000/- per student

Note:

- Rs 1500/- discount will be given in fee for the IMSEC students after attaining minimum 90% attendance during training.
- Final year project assistance will be provided to the students after successfully completion of summer training.

HOD EN

IMS Engineering College, Ghaziabad

Department of Electrical and Electronics Engineering

Date: 21/08/2019

From: HOD (EN)	To: Director Sir

It is to put in your kind information that department of Electrical and Electronics Engineering has organised **an industrial summer training program at ABB Industrial Automation Centre** in two batches (10th June-5th July and 10th July-5th Aug 2019). Fee details of students for above summer training program is as follows:

Sr. No.	Internal	No of Students	Fee @per month (Rs)	Training Duration	Total Amount
1	Internal (IMSEC)	43	5000	1 Month	**215000/-**

This amount has been collected by Rhythm Automation Control Pvt. Ltd., an authorized channel partner of ABB, who has provided the training.

As per MOU, the share of fee to be given to college (@30%) =Rs 64500/-

Total fee reimbursed to IMSEC students=64500/-

Submitted for your kind approval.

Chauhan 21/8/2019

Mr. R. K. Chauhan

HOD (EN)

IMS Engineering College, Ghaziabad
ABB Industrial Automation Centre
Batch 1 (Duration: 10th June-5th July 2019)
Details of fee refunded to students secured 90% of training attendance

Sr. No	Students Name	Branch	Fee Submitted	fee refunded @30%=1500/-	Signature
1	Aamir Aziz	EN	5000/-	1500/-	Az
2	Abhishek bhatnagar	EN	5000/-	1500/-	Abhishek
3	Akash Singh	EN	5000/-	1500/-	A.S
4	Aman Chaurasia	EN	5000/-	1500/-	Aman
5	Anuradha Chaudhary	EC	5000/-	1500/-	Anuradha
6	Arvind Singh	EN	5000/-	1500/-	Arvind Singh
7	Deepak Agnihotri	EC	5000/-	1500/-	Deepak
8	Devesh Gupta	EN	5000/-00	1500/-	Received Devesh Gupta
9	Gagan Solanki	EN	5000	1500/-	gagan
10	Harsh Gurehiya	EN	5000/-	1500/-	Harsh
11	Pankaj kumar	EN	5000/-	1500	Pankaj
12	Prakhar Mall	EC	5000/-	1500/-	Prakhar Mall
13	Prashant Shishodia	EN	5000/-	1500/-	
14	Priya Saxena	EN	5000/-	1500	Priya Saxena
15	Priyansh Goswami	EN	5000/-	1500/-	Priyansh
16	Rakhi Tripathi	EN	5000/-	1500/-	Rakhi
17	Ravi Pratap	EN	5000/-	1500/-	Ravi Pratap
18	Rimsha Iqbal	EN	5000/-	1500/-	Rimsha
19	Satyam Shivansh	EC	5000/-	1500/-	Satyam
20	Shubham Mittal	EN	5000/-	1500/-	Shubham
21	Tathagat Gupta	EN	5000/-	1500/-	Received Tathagat

Yashpal Singh
Director-Training, Rhythm Automation Control Pvt. Ltd

IMS Engineering College, Ghaziabad
ABB Industrial Automation Centre
Batch 9 (Duration: 10th July-5th Aug 2019)

Details of fee refunded to students secured 90% of training attendance

Sr. No	Students Name	Branch	Fee Submitted	Fee refunded @30%=1500/-	Signature
1	Aman	EN	5000/-	1500/-	
2	Anmol Gupta	EN	5000/-	1500/-	
3	Anuj Kumar Maurya	EN	5000/-	1500/-	
4	Arun Datt Kaushik	EN	5000/-	1500/-	
5	Ashutosh Sharma	EN	5000/-	1500/-	
6	Faisal Haneef	EN	5000-/	1500	
7	Kartik Sanonia	EN	5000/-	1500/-	
8	Mohd.Danish	EN	5000/	1500	
9	Mohd.Khalid	EN	5,000	1500.	
10	Prachi Jain	EC	5,000	1500	Prachi
11	Pratiksha kachhawaha	EC	5,000	1500/-	
12	Priyanka Gupta	EC	5000	1500	
13	Sahil Khan	EC	5000/-	1500/-	
14	Shashwat Srivastava	EC	5000/-	1500/-	
15	Shesh Narayan Tiwari	EN	5000/-	1500/-	
16	Srishti Kaushik	EC	5000/-	1500/-	
17	Shiv Bhushan Mishra	EC	5000/-	1500/-	
18	Shubham Saini	EC	5000/-	1500/-	
19	Shubham verma	EN	5,000	1500	
20	Sudhanshu Dwivedi	EN	5000/-	1500/-	
21	Unnati Malviya	EN	5000	1500	
22	Vishesh Singh	EN	5000	1500	

Yashpal Singh
Director-Training, Rhythm Automation Control Pvt. Ltd

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 10/08/19

RA/TC/IMS/2019/139

Certificate

This is to certify that Mr./Ms. Aman has successfully completed Industrial Automation Training during 8th July'19 to 7th Aug'19 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☒ DRIVES AC & DC
- ☒ INSTRUMENTATION
- ☒ DCS
- ☒ PANEL
- ☒ SWITCHGEAR
- ☒ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 10 / 08 / 19

RA/TC//IMS/2019/125

Certificate

This is to certify that Mr./Ms. Gagan Solanki has successfully completed Industrial Automation Training during 10th June '19 to 5th July '19 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☒ DRIVES AC & DC
- ☒ INSTRUMENTATION
- ☒ DCS
- ☒ PANEL
- ☒ SWITCHGEAR
- ☒ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date - 10 / 08 / 19

RA/TC/IMS/2019/137

Certificate

This is to certify that Mr./Ms. Shubham Mittal has successfully completed Industrial Automation Training during 10th June '19 to 5th July '19 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☒ DRIVES AC & DC
- ☒ INSTRUMENTATION
- ☒ DCS
- ☒ PANEL
- ☒ SWITCHGEAR
- ☒ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 10 / 08 / 19

RA/TC/IMS/2019/133

Certificate

This is to certify that Mr./Ms. Ravi Pratap has successfully completed Industrial Automation Training during 10th June' 19 to 5th July' 19 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- [x] PLC
- [x] SCADA
- [x] DRIVES AC & DC
- [x] INSTRUMENTATION
- [x] DCS
- [x] PANEL
- [x] SWITCHGEAR
- [x] NETWORKING

Director
IMSEC, Ghaziabad

Rhythm Automation Learning Centre Noida

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

RA/TC/IMS/2019/118

Date:- 10/08/19

Certificate

This is to certify that Mr./Ms. Abhishek Bhatnagar has successfully completed Industrial Automation Training during 10th June '19 to 5th July '19 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☒ DRIVES AC & DC
- ☒ INSTRUMENTATION
- ☒ DCS
- ☒ PANEL
- ☒ SWITCHGEAR
- ☒ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 10/08/19

RA/TC/IMS/2019/119

Certificate

This is to certify that Mr./Ms. Akash Singh has successfully completed Industrial Automation Training during 10th June '19 to 5th July '19 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☒ DRIVES AC & DC
- ☒ INSTRUMENTATION
- ☒ DCS
- ☒ PANEL
- ☒ SWITCHGEAR
- ☒ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008 Certified Company

ABB Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 10 / 08 / 19

RA/TC/IMS/2019/120

Certificate

This is to certify that Mr./Ms. Aman Chaurasia has successfully completed Industrial Automation Training during 10th June '19 to 5th July '19 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☒ DRIVES AC & DC
- ☒ INSTRUMENTATION
- ☒ DCS
- ☒ PANEL
- ☒ SWITCHGEAR
- ☒ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

RA/TC/IMS/2019/141

Date:- 10/08/19

Certificate

This is to certify that Mr./Ms. Anuj Kumar Maurya has successfully completed Industrial Automation Training during 8th July '19 to 7th Aug '19 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☒ DRIVES AC & DC
- ☒ INSTRUMENTATION
- ☒ DCS
- ☒ PANEL
- ☒ SWITCHGEAR
- ☒ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 10 / 08 / 19

RA/TC/IMS/2019/142

Certificate

This is to certify that Mr./Ms. Arun Datt Kaushik has successfully completed Industrial Automation Training during 8th July '19 to 7th Aug '19 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☒ DRIVES AC & DC
- ☒ INSTRUMENTATION
- ☒ DCS
- ☒ PANEL
- ☒ SWITCHGEAR
- ☒ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 10 / 08 / 19

RA/TC/IMS/2019/122

Certificate

This is to certify that Mr./Ms. Arvind Singh has successfully completed Industrial Automation Training during 10th June '19 to 5th July '19 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☒ DRIVES AC & DC
- ☒ INSTRUMENTATION
- ☒ DCS
- ☒ PANEL
- ☒ SWITCHGEAR
- ☒ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008 Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 10/08/19

RA/TC/IMS/2019/126

Certificate

This is to certify that Mr./Ms. Manish Gurung has successfully completed Industrial Automation Training during 10th June '19 to 5th July '19 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☒ DRIVES AC & DC
- ☒ INSTRUMENTATION
- ☒ DCS
- ☒ PANEL
- ☒ SWITCHGEAR
- ☒ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 10/08/19

RA/TC/IMS/2019/145

Certificate

This is to certify that Mr./Ms. Kartik Saxena has successfully completed Industrial Automation Training during 8th July '19 to 7th Aug '19 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☒ DRIVES AC & DC
- ☒ INSTRUMENTATION
- ☒ DCS
- ☒ PANEL
- ☒ SWITCHGEAR
- ☒ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation

ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 10/08/19

RA/TC/IMS/2019/132

Certificate

This is to certify that Mr./Ms. Rakesh Tripathi has successfully completed Industrial Automation Training during 10th June'19 to 5th July'19 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- [x] PLC
- [x] SCADA
- [x] DRIVES AC & DC
- [x] INSTRUMENTATION
- [x] DCS
- [x] PANEL
- [x] SWITCHGEAR
- [x] NETWORKING

Director
IMSEC, Ghaziabad

Rhythm Automation Learning Centre Noida

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation

ISO 9001:2008 Certified Company

ABB Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 10 / 08 / 19

RA/TC/IMS/2019/134

Certificate

This is to certify that Mr./Ms. Rimsha Iqbal has successfully completed Industrial Automation Training during 10th June '19 to 5th July '19 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☒ DRIVES AC & DC
- ☒ INSTRUMENTATION
- ☒ DCS
- ☒ PANEL
- ☒ SWITCHGEAR
- ☒ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 10/08/19

RA/TC/IMS/2019/144

Certificate

This is to certify that Mr./Ms. Faisal Haneef has successfully completed Industrial Automation Training during 8th July '19 to 7th Aug '19 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☒ DRIVES AC & DC
- ☒ INSTRUMENTATION
- ☒ DCS
- ☒ PANEL
- ☒ SWITCHGEAR
- ☒ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 10 / 08 / 19

RA/TC/IMS/2019/124

Certificate

This is to certify that Mr./Ms. Dwish Gupta has successfully completed Industrial Automation Training during 10th June '19 to 5th July '19 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☒ DRIVES AC & DC
- ☒ INSTRUMENTATION
- ☒ DCS
- ☒ PANEL
- ☒ SWITCHGEAR
- ☒ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 10 / 08 / 19

RA/TC/IMS/2019/146

Certificate

This is to certify that Mr./Ms. Mohd. Danish has successfully completed Industrial Automation Training during 8th July '19 to 7th Aug '19 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☒ DRIVES AC & DC
- ☒ INSTRUMENTATION
- ☒ DCS
- ☒ PANEL
- ☒ SWITCHGEAR
- ☒ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008 Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 10/08/19

RA/TC/IMS/2019/130

Certificate

This is to certify that Mr./Ms. Priya Saxena has successfully completed Industrial Automation Training during 10th June'19 to 5th July'19 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☒ DRIVES AC & DC
- ☒ INSTRUMENTATION
- ☒ DCS
- ☒ PANEL
- ☒ SWITCHGEAR
- ☒ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 10/08/19

RA/TC/IMS/2019/159

Certificate

This is to certify that Mr./Ms. Unnati Malviya has successfully completed Industrial Automation Training during 8th July'19 to 7th Aug'19 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- [x] PLC
- [x] SCADA
- [x] DRIVES AC & DC
- [x] INSTRUMENTATION
- [x] DCS
- [x] PANEL
- [x] SWITCHGEAR
- [x] NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 10/08/19

RA/TC/IMS/2019/147

Certificate

This is to certify that Mr./Ms. Mohd. Khalid has successfully completed Industrial Automation Training during 8th July '19 to 7th Aug '19 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- [x] PLC
- [x] SCADA
- [x] DRIVES AC & DC
- [x] INSTRUMENTATION
- [x] DCS
- [x] PANEL
- [x] SWITCHGEAR
- [x] NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 10/08/19

RA/TC/IMS/2019/158

Certificate

This is to certify that Mr./Ms. Siddhanshu Dwivedi has successfully completed Industrial Automation Training during 8th July'19 to 7th Aug'19 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- [x] PLC
- [x] SCADA
- [x] DRIVES AC & DC
- [x] INSTRUMENTATION
- [x] DCS
- [x] PANEL
- [x] SWITCHGEAR
- [x] NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 10 / 08 / 19

RA/TC/IMS/2019/131

Certificate

This is to certify that Mr./Ms. Priyanshi Goswami has successfully completed Industrial Automation Training during 10th June' 19 to 5th July' 19 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☒ DRIVES AC & DC
- ☒ INSTRUMENTATION
- ☒ DCS
- ☒ PANEL
- ☒ SWITCHGEAR
- ☒ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 10 / 08 / 19

RA/TC/IMS/2019/153

Certificate

This is to certify that Mr./Ms. Ghosh Narayan Tiwari has successfully completed Industrial Automation Training during 8th July '19 to 7th Aug '19 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- [x] PLC
- [x] SCADA
- [x] DRIVES AC & DC
- [x] INSTRUMENTATION
- [x] DCS
- [x] PANEL
- [x] SWITCHGEAR
- [x] NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 10/08/19

RA/TC/IMS/2019/160

Certificate

This is to certify that Mr./Ms. Vishesh Singh has successfully completed Industrial Automation Training during 8th July'19 to 7th Aug'19 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- [x] PLC
- [x] SCADA
- [x] DRIVES AC & DC
- [x] INSTRUMENTATION
- [x] DCS
- [x] PANEL
- [x] SWITCHGEAR
- [x] NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation

ISO 9001:2008
Certified Company

(RHYTHM AUTOMATION Learning Centre Noida – INDIA)

ABB
Authorised Channel Partner

Date:- 10/08/2019

RA/TC/ IMS/2019/117

Certificate

This is to certify that Mr./~~Ms~~ Aamir Aziz has successfully completed

INDUSTRIAL AUTOMATION TRAINING from 10th June,19 to 05th July,19 covering:

☑	PLC	☒	PANEL
☑	SCADA	☒	SWITCHGEAR
☒	DRIVES AC & DC	☒	NETWORKING
☒	INSTRUMENTATION	☒	DCS

Rhythm Automation Learning Centre Noida

Director - Training
Rhythm Automation Learning Centre

Head Office:
Training : Rhythm Automation Control Pvt. Ltd.
C-222, Sec. 63, Noida (U.P.) 201 307, Phone: +91-120-4329488

Training Centre:
IMS Engineering College, Ghaziabad
RKGIT Engineering College, Ghaziabad
Vidya Engineering College, Meerut

Rhythm Automation

ISO 9001:2008
Certified Company

(RHYTHM AUTOMATION Learning Centre Noida – INDIA)

ABB
Authorised Channel Partner

Date:- 10 /08 / 2019

RA/TC/ IMS/ 2019/ 140

Certificate

This is to certify that Mr./~~Ms~~ Anmol Gupta has successfully completed

INDUSTRIAL AUTOMATION TRAINING from 10th July, 19 to 05th Aug, 19 covering:

☑	PLC	☒	PANEL
☑	SCADA	☒	SWITCHGEAR
☒	DRIVES AC & DC	☒	NETWORKING
☒	INSTRUMENTATION	☒	DCS

Rhythm Automation Learning Center Noida

Director - Training
Rhythm Automation Learning Centre

Head Office:
Training : Rhythm Automation Control Pvt. Ltd.
C-222, Sec. 63, Noida (U.P.) 201 307, Phone: +91-120-4329488

Training Centre:
IMS Engineering College, Ghaziabad
RKGIT Engineering College, Ghaziabad
Vidya Engineering College, Meerut

Rhythm Automation

ISO 9001:2008
Certified Company

(RHYTHM AUTOMATION Learning Centre Noida – INDIA)

ABB
Authorised Channel Partner

Date:- 10 /08 /2019

RA/TC/ IMS/2019/157

Certificate

This is to certify that Mr./~~Ms~~ Shubham Verma has successfully completed

INDUSTRIAL AUTOMATION TRAINING from 10th July, 19 to 05th Aug, 19 covering:

☑	PLC	☒	PANEL
☑	SCADA	☒	SWITCHGEAR
☒	DRIVES AC & DC	☒	NETWORKING
☒	INSTRUMENTATION	☒	DCS

Rhythm Automation Learning Centre Noida

Director - Training
Rhythm Automation Learning Centre

Head Office:
Training : Rhythm Automation Control Pvt. Ltd.
C-222, Sec. 63, Noida (U.P.) 201 307, Phone: +91-120-4329488

Training Centre:
IMS Engineering College, Ghaziabad
RKGIT Engineering College, Ghaziabad
Vidya Engineering College, Meerut

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 10 / 08 / 19

RA/TC/IMS/2019/143

Certificate

This is to certify that Mr./Ms. Ashutosh Sharma has successfully completed Industrial Automation Training during 8th July '19 to 7th Aug '19 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☒ DRIVES AC & DC
- ☒ INSTRUMENTATION
- ☒ DCS
- ☒ PANEL
- ☒ SWITCHGEAR
- ☒ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

IMS Engineering College, Ghaziabad

Department of Electrical and Electronics Engineering

From: HOD (EN)	To: All HODs

Date: 15th Sept 2018

Now a day's almost all manufacturing industries are proceeding for automation to survive in globally competitive market to increase productivity and improve quality of products. This increases the demand of trained engineers in the field of industrial automation. In order to meet the demand of modern automated industries in terms of skilled technocrats and well trained engineers, **Department of Electrical and Electronics Engineering** has established a **Centre of Excellence, ABB Industrial Automation Centre** in C Block Room no 307.

The main aim of this Centre is to bridge the gap between the requirements of modern industries and knowledge of our graduates. This will also enhance the worth of institution in terms of providing summer training, increase in placement and interaction with industrialist. In this regard the Centre is going to organize **4 months advanced industrial automation** training from 21st September 2018. So you are requested to motivate the students to join the program and get the benefits.

Details of Training:

Duration: 4 Months

Starting date: 21st September 2018

Course Fee: Rs 20000/- per student

- Modules of training are attached with mail.

- For more details regarding registration contact to Mr Yashpal Singh, Rhythm Automation Control Pvt. Ltd. (Mobile: 9958444794) & Mr. O. P. Yadav, Assistant Professor, EN Deptt (Mobile 7557349136).

Note:

- 30% discount will be given in fee for the IMSEC students after attaining minimum 90% attendance of training.
- Students will be provided advance industrial automation training certificate by ABB.
- Final year project assistance will be provided to the students after successfully completion of training.
- **Job Assistance:** 100% job assistance will be provided to students securing 90% attendance during training. In this regard, minimum 5 interview assistance will be provided to each student in renowned company.

for Arora

HOD-EN

IMS Engineering College, Ghaziabad
Centre of Excellence in Industrial Automation
Details of students registered for Advanced Training (2018-19)

S.No	RA/TC/IMS/2018/NO	Name
1	RA/TC/IMS/2018/117	Ankesh Chaturvedi
2	RA/TC/IMS/2018/118	Amarjeet Kumar
3	RA/TC/IMS/2018/119	Deepak Kushwaha
4	RA/TC/IMS/2018/120	Mukesh Kr.Mandal
5	RA/TC/IMS/2018/121	Nitish Yadav
6	RA/TC/IMS/2018/122	Shray Tyagi
7	RA/TC/IMS/2018/123	Sameer
8	RA/TC/IMS/2018/124	Anurag Yadav
9	RA/TC/IMS/2018/125	Himanshu Gautam
10	RA/TC/IMS/2018/126	Prashant Gupta
11	RA/TC/IMS/2018/127	Abhishek Yadav

Yashpal Singh
Rhythm Automation Control Pvt Ltd.

IMS Engineering College, Ghaziabad

ABB Industrial Automation Centre (PLC/SCADA)

List of Placed Students in Session 2018-19

Sr. No	Name of Trainee	Name of Company 1	Name of Company 2
1	Ankesh Chaturvedi	P2 Power Solutions Pvt Ltd	
2	Amarjeet Yadav	P2 Power Solutions Pvt Ltd	
3	Shreya Tyagi	P2 Power Solutions Pvt Ltd	
4	Deepak Kumar Kushwaha	Tosha International Pvt Ltd	
5	Mukesh Kumar Mandal	Tosha International Pvt Ltd	
6	Anurag Yadav	Tosha International Pvt Ltd	
7	Md Sameer	Presto Stantest Pvt Ltd	Auxilink Projects and Machinery Pvt Ltd
8	Himanshu Gautam	Rhythm Automation Control Pvt Ltd	
9	Prashant Gupta	Tosha International Pvt Ltd	
10	Nitish yadav	Auxilink Projects and Machinery Pvt Ltd	
11	Abhishek Yadav	Rhythm Automation Control Pvt Ltd	

01/07/2019

Prof. R.K Chauhan
HOD (EN)

VARDHAMAN RECRUITERS

TOSHA INTERNATIONAL

Private & Confidential

Date: 26/03/2019

LETTER OF INTENT

Dear Deepak Kumar Kushwaha.

With reference to your discussions with us, we are pleased to extend an letter of retainer ship employment on the following terms .

1. Designation: G.E.T (Site Engineer)
2. Retainer ship During Probation: INR 10000/ Per Month.
3. Location: Uttrakhand. You may need to relocate as per project requirement.
4. Your D.O.J Would be Communicated a day prior to your actual DOJ..

As Per Our agreement With Tosha International, You Will be on Probation for First Six Month. Post Successful Probation, based on your training and Performance Your CTC would be Three Lac Only.

Your Initial place of work will be at Uttrakhand. You would be On Job training by Company. You need to bring Two Wheeler. Travelling allowances & Accommodation Cost will be borne by Company.

Please treat all the information shared with you in this offer with complete confidentiality. Any Official /unofficial or unauthorized disclosure or usage of these details with any other company or person, will automatically lead to cancellation of your appointment without any further discussions.

You have to report at our Head Office with the following documents along with originals:

Educational qualification certificates
- Two Wheeler is Must
- Latest 4 passport size photographs
- Identification proof (Aadhar Card/ Driving License Must)
- Date of birth proof (High School Certificate/ Aadhar Card/ Passport/ Voter ID card/PAN card)
- Address proof (Aadhar Card/ Passport/ Voter ID card/ Driving License)
- PAN card

Acknowledgment & Acceptance: You acknowledge that you are not subject to any contractual or legal restriction pursuant to an agreement with any prior employer which may prevent you from accepting this position as a Tosha International employee. Please read the agreements and feel free to review it with counsel of your choice. If you are in agreement with the terms of this letter, please sign the duplicate copy of the letter as evidence of your acceptance and return it to us, failing which, the offer will be withdrawn.

Please feel free to contact us should you have any questions about this offer of employment. We look forward to working with you and will do all we can to ensure that the transition is smooth, and that our relationship is mutually beneficial.

Sincerely

For **Vardhaman Recruiters RPO**

Authorized Signatory

Agreed and Accepted:

I have read and agree with the terms stated in this agreement, which supersedes and replaces all prior negotiations or agreements, whether written or oral. This agreement reflects the full and complete agreement between me and VR & Tosha International. On the subjects contained and referenced herein. My signature below constitutes a full and complete understanding of the terms and conditions contained in this agreement, and constitutes an acceptance of this offer of employment.

lalit kumar <lalit.kumar@imsec.ac.in>

Fwd: Re.Joining Confirmation

1 message

Vijay Kumar <vijay5686@gmail.com> Mon, Oct 12, 2020 at 2:35 PM
To: lalit kumar <lalit.kumar@imsec.ac.in>

---------- Forwarded message ---------
From: **yash singh** <yashpal.singh2050@gmail.com>
Date: Mon, 12 Oct 2020, 1:47 pm
Subject: Fwd: Re.Joining Confirmation
To: <vijay5686@gmail.com>

---------- Forwarded message ---------
From: **hrd.techjobsengg** <hrd.techjobsengg@gmail.com>
Date: Thu, 28 Feb, 2019, 6:30 pm
Subject: Fwd: Re.Joining Confirmation
To: yashpal.singh2050 <yashpal.singh2050@gmail.com>

Sir plz find the mail

Sent from vivo smartphone

---------- Forwarded ----------
Sender: HR P2Power <HR@p2power.com>
Date: Feb 28, 2019 6:11 PM
Subject: Re.Joining Confirmation
Recipient: "hrd.techjobsengg" <hrd.techjobsengg@gmail.com>
CC: Rini Chordia <rini.chordia@p2power.com>

Dear Ritika,

These three candidates are conformed for the profile of 'Trainee-Engineer' They need to be join from 4th March 2019 at our Office 9am.

1. Amarjeet kumar

2. Shray tyagi

3. Ankesh Chaturvedi

List of documents to be submitted on date of joining:-

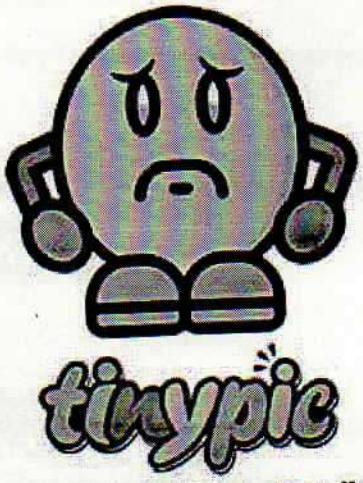
1.Three passport size photographs.
2. Copies and Original of all Educational certificates (10th, 12th, Degree and PG)
3. Copy of Govt ID proof (Pan Card, Aadhar Card), its mandatory

Note-As per our company policy we keep a original certificate(10th or 12th)

With Regards,
Surbhi Gupta

HR Team

HR Team
(Mob: 7011337973)



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R&D Centre: STEP, IIT Kharagpur - 721302

IMS Engineering College, Ghaziabad

Department of Electrical and Electronics Engineering

From: HOD (EN)	To: All HODs

Date: 20th April 2018

Now a day's almost all manufacturing industries are proceeding for automation to survive in globally competitive market to increase productivity and improve quality of products. This increases the demand of trained engineers in the field of industrial automation. In order to meet the demand of modern automated industries in terms of skilled technocrats and well trained engineers, **Department of Electrical and Electronics Engineering** has established a **Centre of Excellence on Industrial Automation (PLC/SCADA)** in **C Block Room no 307** in collaboration with **ABB India Ltd**.

The main aim of this Centre is to bridge the gap between the requirement of modern industries and knowledge of our graduates. This will also enhance the worth of institution in terms of providing summer training, increase in placement and interaction with industrialist.

In this regard the Centre is going to provide **4 week summer training on PLC/SCADA** as per details given below.

So you are requested to motivate the students to join **summer training program** to enhance their technical skill as well as placement opportunity.

Details of Training:

Duration: 4 Weeks (in two sessions)

Course Contents: Attached

Course Fee: Rs 5000/- per student

Note:

- Rs 1500/- discount will be given in fee for the IMSEC students after attaining minimum 90% attendance during training.
- Final year project assistance will be provided to the students after successfully completion of summer training.

For

HOD EN

IMS Engineering College, Ghaziabad
Centre of Excellence in Industrial Automation

Details of students registered for Summer Training First Batch (2018-19)

	RA/TC/IMS/2018/NO	Students Name
1	RA/TC/IMS/2018/84	Akash Kumar
2	RA/TC/IMS/2018/85	Amarjeet Kumar
3	RA/TC/IMS/2018/86	Ankesh Chaturvedi
4	RA/TC/IMS/2018/87	Anurag Yadav
5	RA/TC/IMS/2018/88	Arun Kumar Rati
6	RA/TC/IMS/2018/89	ASHISH KUMAR SINGH
7	RA/TC/IMS/2018/90	AsHISH SUNDRIYAL
8	RA/TC/IMS/2018/91	Deepanshu Chaudhary
9	RA/TC/IMS/2018/92	Himanshu Gautam
10	RA/TC/IMS/2018/93	jatin kumar
11	RA/TC/IMS/2018/94	Juli Kanaujia
12	RA/TC/IMS/2018/95	MANISH KUMAR
13	RA/TC/IMS/2018/96	Prateek Mishra
14	RA/TC/IMS/2018/97	PRIYESH RANJAN
15	RA/TC/IMS/2018/98	Sumit Kumar
16	RA/TC/IMS/2018/99	Swaleha
17	RA/TC/IMS/2018/100	Vaibhav Sahu

Yashpal Singh
Rhythm Automation Control Pvt Ltd.

IMS Engineering College, Ghaziabad
Centre of Excellence in Industrial Automation

Details of students registered for Summer Training Second Batch (2018-19)

	RA/TC/IMS/2018/NO	Students Name
1	RA/TC/IMS/2018/101	ABHISHEK Gupta
2	RA/TC/IMS/2018/102	ABHISHEK kumar
3	RA/TC/IMS/2018/103	Ashish kr.Gupta
4	RA/TC/IMS/2018/104	Deepak Kushwaha
5	RA/TC/IMS/2018/105	Kailash Chaurasiya
6	RA/TC/IMS/2018/106	Kshitij Singh
7	RA/TC/IMS/2018/107	Md.Sameer
8	RA/TC/IMS/2018/108	Mukesh Kr.Mandal
9	RA/TC/IMS/2018/109	NARESH SHARMA
10	RA/TC/IMS/2018/110	Nitish Yadav
11	RA/TC/IMS/2018/111	Pyush Yadav
12	RA/TC/IMS/2018/112	Rahul Prasad
13	RA/TC/IMS/2018/113	Shashi Bhushan
14	RA/TC/IMS/2018/114	Shray Tyagi
15	RA/TC/IMS/2018/115	vishal Patel
16	RA/TC/IMS/2018/116	VIVEK KUMAR MANDAL

Yashpal Singh
Rhythm Automation Control Pvt Ltd.

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 29 /08 / 2018

RA/TC/ims/2018/088

Certificate

This is to certify that Mr./Ms. Ashish Kumar Singh has successfully completed Industrial Automation Training during 4th June 2018 to 29th June 2018 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☒ DRIVES AC & DC
- ☒ INSTRUMENTATION
- ☒ DCS
- ☒ PANEL
- ☒ SWITCHGEAR
- ☒ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 29 / 08 / 2018

RA/TC/IMS/2018/101

Certificate

This is to certify that Mr./Ms. Abhishek Gupta has successfully completed Industrial Automation Training during 2nd July 2018 to 30th July 2018 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☒ DRIVES AC & DC
- ☒ INSTRUMENTATION
- ☒ DCS
- ☒ PANEL
- ☒ SWITCHGEAR
- ☒ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 29 / 08 / 2018

RA/TC/ IMS/ 2018/ 102

Certificate

This is to certify that Mr./Ms. Abhishek Kumar has successfully completed Industrial Automation Training during 2nd July 2018 to 30th July 2018 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☒ DRIVES AC & DC
- ☒ INSTRUMENTATION
- ☒ DCS
- ☒ PANEL
- ☒ SWITCHGEAR
- ☒ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 29 / 08 / 2018

RA/TC/IMS/2018/087

Certificate

This is to certify that Mr./Ms. Anurag Yadav has successfully completed Industrial Automation Training during 4th June 2018 to 29th June 2018 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☒ DRIVES AC & DC
- ☒ INSTRUMENTATION
- ☒ DCS
- ☒ PANEL
- ☒ SWITCHGEAR
- ☒ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 29 / 08 / 2018

RA/TC/IMS/2018/085

Certificate

This is to certify that Mr./Ms. Amarjeet Kumar has successfully completed Industrial Automation Training during 4th June 2018 to 29th June 2018 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☒ DRIVES AC & DC
- ☒ INSTRUMENTATION
- ☒ DCS
- ☒ PANEL
- ☒ SWITCHGEAR
- ☒ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 29 / 08 / 2018

RA/TC/IMS/2018/107

Certificate

This is to certify that Mr./Ms. Md: Sameer has successfully completed Industrial Automation Training during 2nd July 2018 to 30th July 2018 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☒ DRIVES AC & DC
- ☒ INSTRUMENTATION
- ☒ DCS
- ☒ PANEL
- ☒ SWITCHGEAR
- ☒ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm
Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 29 / 08 / 2018

RA/TC/ims/2018/110

Certificate

This is to certify that Mr./Ms. Nitish Yadav has successfully completed Industrial Automation Training during 2nd July 2018 to 30th July 2018 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☒ DRIVES AC & DC
- ☒ INSTRUMENTATION
- ☒ DCS
- ☒ PANEL
- ☒ SWITCHGEAR
- ☒ NETWORKING

Director
IMSEC, Ghaziabad

Rhythm Automation Learning Centre Noida

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 29 / 08 / 2018

RA/TC/IMS/2018/104

Certificate

This is to certify that Mr./Ms. Deepak Kushwaha has successfully completed Industrial Automation Training during 2nd July 2018 to 30th July 2018 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☒ DRIVES AC & DC
- ☒ INSTRUMENTATION
- ☒ DCS
- ☒ PANEL
- ☒ SWITCHGEAR
- ☒ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:-29/08/2018

RA/TC/IMS/2018/103

Certificate

This is to certify that Mr./Ms. Ashish Kumar Gupta has successfully completed Industrial Automation Training during 2nd July 2018 to 30th July 2018 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☒ DRIVES AC & DC
- ☒ INSTRUMENTATION
- ☒ DCS
- ☒ PANEL
- ☒ SWITCHGEAR
- ☒ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation

ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 29/08/2018

RA/TC/IMS/2018/112

Certificate

This is to certify that Mr./Ms. Rahul Prasad has successfully completed Industrial Automation Training during 2nd July 2018 to 30th July 2018 at ABB Industrial Automation Centre IMS Engineering College, Ghaziabad., covering

- ☑ PLC
- ☑ SCADA
- ☒ DRIVES AC & DC
- ☒ INSTRUMENTATION
- ☒ DCS
- ☒ PANEL
- ☒ SWITCHGEAR
- ☒ NETWORKING

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

IMS Engineering College, Ghaziabad

Department of Electrical and Electronics Engineering

From: HOD (EN)	To: All HODs

Date: 6th Sept 2017

Now a day's almost all manufacturing industries are proceeding for automation to survive in globally competitive market to increase productivity and improve quality of products. This increases the demand of trained engineers in the field of industrial automation. In order to meet the demand of modern automated industries in terms of skilled technocrats and well trained engineers, **Department of Electrical and Electronics Engineering** has established a **Centre of Excellence, ABB Industrial Automation Centre** in C Block Room no 307.

The main aim of this Centre is to bridge the gap between the requirements of modern industries and knowledge of our graduates. This will also enhance the worth of institution in terms of providing summer training, increase in placement and interaction with industrialist. In this regard the Centre is going to organize **4 months advanced industrial automation** training from 13th September 2017. So you are requested to motivate the students to join the program and get the benefits.

Details of Training:

Duration: 4 Months

Starting date: 13th September 2017

Course Fee: Rs 20000/- per student

- Modules of training are attached with mail.

- For more details regarding registration contact to Mr Yashpal Singh, Rhythm Automation Control Pvt. Ltd. (Mobile: 9958444794) & Mr. O. P. Yadav, Assistant Professor, EN Deptt (Mobile 7557349136).

Note:

- 30% discount will be given in fee for the IMSEC students after attaining minimum 90% attendance of training.
- Students will be provided advance industrial automation training certificate by ABB.
- Final year project assistance will be provided to the students after successfully completion of training.
- **Job Assistance:** 100% job assistance will be provided to students securing 90% attendance during training. In this regard, minimum 5 interview assistance will be provided to each student in renowned company.

For

HOD-EN

IMS Engineering College, Ghaziabad
Centre of Excellence in Industrial Automation
Details of students registered for Advanced Training (2017-18)

	RA/TC/IMS/2018/NO	Students Name
1	RA/TC/IMS/2018/69	Ankur Goshwami
2	RA/TC/IMS/2018/70	Prageet Srivastava
3	RA/TC/IMS/2018/71	Nitya Nand Singh
4	RA/TC/IMS/2018/72	Hemant Bhardwaj
5	RA/TC/IMS/2018/73	Sumeet Singh
6	RA/TC/IMS/2018/74	Waqas Naeem
7	RA/TC/IMS/2018/75	Amit Kumar
8	RA/TC/IMS/2018/76	Kamal jeet
9	RA/TC/IMS/2018/77	Krishna Kumar
10	RA/TC/IMS/2018/78	Chandan
11	RA/TC/IMS/2018/79	Vinod Singh
12	RA/TC/IMS/2018/80	Mohd Javed
13	RA/TC/IMS/2018/81	Avaneesh Singh
14	RA/TC/IMS/2018/82	Suraj Kumar
15	RA/TC/IMS/2018/83	Uday Singh

Yashpal Singh
Rhythm Automation Control Pvt Ltd.

IMS Engineering College, Ghaziabad

ABB Industrial Automation Centre

Details of Advance Course students Placement (2017-18)

Sr. No	Students Name	Mobile No.	Placed
1	Ankur Goshwami	9711566808	Rhythm Automation Control Pvt.Ltd
2	Prageet Srivastava	7838593623	Rhythm Automation Control Pvt.Ltd
3	Nitya Nand Singh	7065180781	Rhythm Automation Control Pvt.Ltd
4	Hemant Bhardwaj	9911883422	Need Placement
5	Sumeet Singh	7011496361	Need Placement
6	Waqas Naeem	7838622568	Arro tech pvt.ltd
7	Amit Kumar	8587837372	GG POWER LTD
8	Kamal jeet	8860301702	No need placement
9	Krishna Kumar	9473154725	No need placement
10	Chandan	7701825741	Rhythm Automation Control Pvt.Ltd
11	Vinod Singh	7408156150	omshive enterprise pvt ltd
12	Mohd Javed	9997961788	Not Placed
13	Avaneesh Singh	9958545717	Not Placed
14	Suraj Kumar	9717616840	Rhythm Automation Control Pvt.Ltd
15	Uday Singh	7053899094	No Need Placement

Yashpal Singh
Rhythm Automation Control Pvt Ltd

IMS Engineering College, Ghaziabad

Department of Electrical and Electronics Engineering

From: HOD (EN)	To: All HODs

Date: 29th April 2017

Now a day's almost all manufacturing industries are proceeding for automation to survive in globally competitive market to increase productivity and improve quality of products. This increases the demand of trained engineers in the field of industrial automation. In order to meet the demand of modern automated industries in terms of skilled technocrats and well trained engineers, **Department of Electrical and Electronics Engineering** has established a **Centre of Excellence on Industrial Automation (PLC/SCADA)** in **C Block Room no 307** in collaboration with **ABB India Ltd**.

The main aim of this Centre is to bridge the gap between the requirement of modern industries and knowledge of our graduates. This will also enhance the worth of institution in terms of providing summer training, increase in placement and interaction with industrialist.

In this regard the Centre is going to provide **4 week summer training on PLC/SCADA in two batches** as per details given below.

So you are requested to motivate the students of other branches of IMSEC as well as outside colleges to join **summer training program** to enhance their technical skill as well as placement opportunity.

Details of Training:

Duration: 4 Weeks

Batch1: Just After University Theory and Practical Exam

Batch2: 1st July 2017

Course Contents: Attached

Course Fee: Rs 5000/- per student

For any details about course curriculum contact:-

Mr. O.P.Yadav, Mobile No-7557349136, Room no B-104

Mr. Yashpal (trainer from Rhythm Automation, channel partner of ABB), Mobile No: 9958444794, Room No-C-307

Note:

- Rs 1500/- discount will be given in fee for the IMSEC students after attaining minimum 90% attendance during training.
- Final year project assistance will be provided to the students after successfully completion of summer training.

Prof. (Dr.) Rishi Asthana

HOD EN

For Approval

SUMMER TRAINING COURSE ACCORDING TO TIME		Time (mins)
Topics	**Sub topics**	
Welcome Address (Delivered by HR Manager or Trainer as per the decision of the Branch Manager)	Rhythm Profile Placements Role of RHYTHM in the automation industry Automation and EE, EC, EI branches Future growth path in different industries Evaluation and Grading System	30
Industrial Control System	Examples	20
Automation	Introduction and its Types, History, Application & Need Leading Automation Companies	30
Human Machine Interface (HMI) Supervisory Control and Data Acquisition (SCADA)	Introduction Leading Manufacturers of SCADA System	20
Programmable Logic Controllers (PLC)	Introduction	20
Industrial Motor and Drives	Introduction	5
Distributed Control System	Introduction	5
Process Instrumentation	Introduction	5
Panel Designing through AutoCAD and E-Plan	Introduction	5
On Site Practical Exposure	Introduction	5
Business Ethics	Introduction and Need	5
Softskill Development	Introduction and Need	5
SCADA/HMI Theory	Introduction of SCADA/ HMI	15
	Types of SCADA/ HMI Software	10
	Licensing Concepts	10
	Software Overview	20
	Tag Database Development	30
	Graphic Display Settings	10
	Introduction of Piping and Instrumentation Diagram	10
	Introduction of Process and Instrumentation Diagram	10
SCADA/HMI Lab	Creating your HMI application Graphic Display Setting	20
	Tags, Tag types, Tag creation	20
	Animation, Simple Animation through Memory and system tags	40
	Creation of Buttons	10
	Exercise	20

PLC Theory	Introduction of PLC	15
	Block Diagram of PLC and Role of each module	20
	Types of I/O Modules	20
	I/O Configuration Types	10
	Scan Cycle of PLC	15
	PLC Wiring : Source and Sink Concept	20
	PLC Programming Software Introduction Basic Instructions	20
PLC Lab	PLC Lab Kit Hardware Introduction, control bulder plus and Communication with PLC	20
	PLC programming S/W, Creating your application, Data Files and I/O Addressing	15
	Introduction bit Instructions(XIC, XIO ,OTE) Uploading and Downloading	15
	Concept of Switching function w.r.t to field contacts, Start/Stop Logic and Holding	40
	Realization of logic gates (AND,OR ,NOR etc) by bit Instructions	30
PLC-SCADA Communication	Add data server or OPC Server, Topic creation and verification of communication	15
	Color Animation, Create PBs and Indicators with respect to Start/Stop logic in PLC and verify the communication	15
	PLC Timers and function of Timers	30
	PLC-SCADA Communication	60
	Timer and its Types, Applications	60
	Exercise based on Timers	120
PLC/SCADA/HMI Lab	Scripts and its Types	20
	Popup and Parameter File Creation	20
	Adding Existing HMI components, Expression on animation ,Global Object's Image Adding	20
	Exercise based on PLC Timers and SCADA Animations	60
	Scripts and its Types	40

	Creating Pop up and window navigation Generating Smart Symbol / Break Cell and Make Cell Animations	40
	Indirect addressing and parameter passing	40
PLC / SCADA / HMI Theory / Lab	PLC counters and function of counters	60
	PLC Counters and timers related exercise	120
	Comparison, Move and Logical Instructions	60
	Mathematical Instructions	30
	Exercise	240
SCADA/HMI Theory	Alarms and events	40
	Data logging and trending	50
	Tag data base Importing and exporting	30
	Active-X Control	40
	Recipe Control	45
	Security	35
PLC Theory	Advanced and Program Control Instructions of PLC and related exercise	120
	Introduction of Functional Block Diagram and concept of FBD logic development	120
Project Lab	HMI Development for respective project Note- Screen development, Animation , Tag Data base, popup creation, alarm configuration, Logging and trending, Communication, Launching runtime are covered	300
Project Lab		
Project Lab	Logic Development for respective project	300
Project Lab		
Project Lab	Simulation of project	240
	Acceptance Test	
	Interview Question related to PLC/HMI Project	
Project Lab	Simulation of project	240
	Acceptance Test	
	Interview Question related to PLC/HMI Project	
TEST	PLC SCADA	120
Miner Project	PLC/SCADA BASED	240
	TOTAL TIME IN MINITE	3605

IMS Engineering College, Ghaziabad
Centre of Excellence in Industrial Automation
Details of students registered for Summer Training First Batch (2017-18)

S.N	RA/TC/IMS/2017/NO	Saket Bhari Vats
1	RA/TC/IMS/2017/26	Ram Bachan Yadav
2	RA/TC/IMS/2017/27	Gaurav Singh
3	RA/TC/IMS/2017/28	Amit Kumar
4	RA/TC/IMS/2017/29	Anubhav Singh
5	RA/TC/IMS/2017/30	Prashant Kumar
6	RA/TC/IMS/2017/31	Muneesh Kumar
7	RA/TC/IMS/2017/32	Ankur Rawat
8	RA/TC/IMS/2017/33	Abhay Sohne
9	RA/TC/IMS/2017/34	Richa kumari
10	RA/TC/IMS/2017/35	Ashutosh Khushwahe
11	RA/TC/IMS/2017/36	Avinesh Kumar
12	RA/TC/IMS/2017/37	Amrit Pal Singh
13	RA/TC/IMS/2017/38	Harsh Singh
14	RA/TC/IMS/2017/39	Devesh Tiwari
15	RA/TC/IMS/2017/40	Mayank Kr. Varshnuy
16	RA/TC/IMS/2017/41	Akhilesh Kumar
17	RA/TC/IMS/2017/42	Ankur Goswami
18	RA/TC/IMS/2017/43	Durgesh Kumar
19	RA/TC/IMS/2017/44	Sonu Tyagi
20	RA/TC/IMS/2017/45	Anand Chauhan
21	RA/TC/IMS/2017/46	Piyush Verma
22	RA/TC/IMS/2017/47	Gaurav Mishra
23	RA/TC/IMS/2017/48	Manil Sharma

Yashpal Singh
Rhythm Automation Control Pvt Ltd.

IMS Engineering College, Ghaziabad
Centre of Excellence in Industrial Automation
Details of students registered for Summer Training Second Batch (2017-18)

S.N	RA/TC/IMS/2017/No	Students Name
1	RA/TC/IMS/2017/49	Uday Singh
2	RA/TC/IMS/2017/50	Shradha Dwivedi
3	RA/TC/IMS/2017/51	Akriti Awasthi
4	RA/TC/IMS/2017/52	Apurv Jaiswal
5	RA/TC/IMS/2017/53	Krishna Bajpai
6	RA/TC/IMS/2017/54	Waqas Naeem
7	RA/TC/IMS/2017/55	Nityanand Singh
8	RA/TC/IMS/2017/56	Shubham Tyagi
9	RA/TC/IMS/2017/57	Shalini Sharma
10	RA/TC/IMS/2017/58	Mohd. Saquib Siraj
11	RA/TC/IMS/2017/59	Avneesh Kumar Singh
12	RA/TC/IMS/2017/60	Suraj Singh
13	RA/TC/IMS/2017/61	Divya Singh
14	RA/TC/IMS/2017/62	Satyam Gupta
15	RA/TC/IMS/2017/63	Avinash Singh
16	RA/TC/IMS/2017/64	Shubhanshu Pandey
17	RA/TC/IMS/2017/65	Vivek Kumar Keshri
18	RA/TC/IMS/2017/66	Brij Mohan Singh
19	RA/TC/IMS/2017/67	Deepak Yadav
20	RA/TC/IMS/2017/68	Prageet Srivastava

Yashpal Singh
Rhythm Automation Control Pvt Ltd.

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:-21 / 08 / 2017

RA/TC/IMS/2017/48

Certificate

This is to certify that Mr./Ms. Ankur Rawat has successfully completed Industrial Automation Training covering PLC & SCADA From 5 June, 2017 to 4 July, 2017 at ABB Industrial Automation Centre, IMS Engineering College, Ghaziabad.

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

IMS Engineering College, Ghaziabad

Department of Electrical and Electronics Engineering

From: HOD (EN)	To: All HODs

Date: 28th Sept 2016

Now a day's almost all manufacturing industries are proceeding for automation to survive in globally competitive market to increase productivity and improve quality of products. This increases the demand of trained engineers in the field of industrial automation. In order to meet the demand of modern automated industries in terms of skilled technocrats and well trained engineers, **Department of Electrical and Electronics Engineering** has established a **Centre of Excellence, ABB Industrial Automation Centre** in C Block Room no 307.

The main aim of this Centre is to bridge the gap between the requirements of modern industries and knowledge of our graduates. This will also enhance the worth of institution in terms of providing summer training, increase in placement and interaction with industrialist. In this regard the Centre is going to organize **4 months advanced industrial automation** training from 3rd October 2016. So you are requested to motivate the students to join the program and get the benefits.

Details of Training:

Duration: 4 Months

Starting date: 3rd October 2016

Course Fee: Rs 20000/- per student

- Modules of training are attached with mail.

- For more details regarding registration contact to Mr Yashpal Singh, Rhythm Automation Control Pvt. Ltd. (Mobile: 9958444794) & Mr. O. P. Yadav, Assistant Professor, EN Deptt (Mobile 7557349136).

Note:

- 30% discount will be given in fee for the IMSEC students after attaining minimum 90% attendance of training.
- Students will be provided advance industrial automation training certificate by ABB.
- Final year project assistance will be provided to the students after successfully completion of training.
- **Job Assistance:** 100% job assistance will be provided to students securing 90% attendance during training. In this regard, minimum 5 interview assistance will be provided to each student in renowned company.

For

HOD-EN

IMS Engineering College, Ghaziabad
Centre of Excellence in Industrial Automation

Details of students registered for Advance Training (2016-17)

		Students Name
1	RA/TC/IMS/2017/44	Satyender pratap singh
2	RA/TC/IMS/2017/45	Rishi Kumar Anand
4	RA/TC/IMS/2017/46	Autul Chauhan
5	RA/TC/IMS/2017/47	Sunny Gill
6	RA/TC/IMS/2017/48	Adarsh Singh
7	RA/TC/IMS/2017/49	Pankaj Singh Sirohi
8	RA/TC/IMS/2017/50	Satyam shankhdhar
9	RA/TC/IMS/2017/51	Md.Afsar
10	RA/TC/IMS/2017/52	Ankur Chauhan
11	RA/TC/IMS/2017/53	Devansh Gupta
12	RA/TC/IMS/2017/54	Bipul kumar
14	RA/TC/IMS/2017/55	Ajay raj sharma
15	RA/TC/IMS/2017/56	Ashish kumar
17	RA/TC/IMS/2017/57	SANJEEV(NEPAL)
18	RA/TC/IMS/2017/58	AVADESH SAHNI
19	RA/TC/IMS/2017/59	Lalit Kumar

Yashpal Singh
Rhythm Automation Control Pvt Ltd.

IMS Engineering College, Ghaziabad

ABB Industrial Automation Centre

List of placed students through Advance Training (2016-17)

Sr. No	Name	Placement Status	Placed Company
1	Satyender pratap singh	placed	Ashian Engineering Company India
2	Pankaj Singh Sirohi	placed	placed in software company
3	Ankur Shrama	placed	Rhythm Automation Control PVT. Ltd
4	Bipul kumar	placed	Rhythm Automation Control PVT. Ltd
5	Ashish kumar	placed	Ashian Engineering Company India
6	Awadhesh Sahni	placed	Rhythm Automation Control PVT. Ltd

Yashpal Singh
Rhythm Automation Control Pvt Ltd

IMS Engineering College, Ghaziabad

Department of Electrical and Electronics Engineering

From: HOD (EN)	To: All HODs

Date: 5th May 2016

Now a day's almost all manufacturing industries are proceeding for automation to survive in globally competitive market to increase productivity and improve quality of products. This increases the demand of trained engineers in the field of industrial automation. In order to meet the demand of modern automated industries in terms of skilled technocrats and well trained engineers, **Department of Electrical and Electronics Engineering** has established a **Centre of Excellence on Industrial Automation (PLC/SCADA)** in **C Block Room no 307** in collaboration with **ABB India Ltd.**

The main aim of this Centre is to bridge the gap between the requirement of modern industries and knowledge of our graduates. This will also enhance the worth of institution in terms of providing summer training, increase in placement and interaction with industrialist.

In this regard the Centre is going to provide **4 week summer training on PLC/SCADA** as per details given below.

So you are requested to motivate the students to join **summer training program** to enhance their technical skill as well as placement opportunity.

Details of Training:

Duration: 4 Weeks (in two sessions)

Session I: 7th June to 1st July 2016

Session II: 4th July to 29th July 2016

Course Contents: Attached

Course Fee: Rs 5000/- per student

Note:

- Rs 1500/- discount will be given in fee for the IMSEC students after attaining minimum 90% attendance during training.
- Students will be provided industrial summer training certificate as well as PLC/SCADA training certificate by ABB.
- Final year project assistance will be provided to the students after successfully completion of summer training.

Prof. (Dr.) Rishi Asthana

HOD EN

For Asstt

SUMMER TRAINING COURSE ACCORDING TO TIME		Time (mins)
Topics	**Sub topics**	
Welcome Address (Delivered by HR Manager or Trainer as per the decision of the Branch Manager)	Rhythm Profile Placements Role of RHYTHM in the automation industry Automation and EE, EC, EI branches Future growth path in different industries Evaluation and Grading System	30
Industrial Control System	Examples	20
Automation	Introduction and its Types, History, Application & Need Leading Automation Companies	30
Human Machine Interface (HMI) Supervisory Control and Data Acquisition (SCADA)	Introduction Leading Manufacturers of SCADA System	20
Programmable Logic Controllers (PLC)	Introduction	20
Industrial Motor and Drives	Introduction	5
Distributed Control System	Introduction	5
Process Instrumentation	Introduction	5
Panel Designing through Autocad and E-Plan	Introduction	5
On Site Practical Exposure	Introduction	5
Business Ethics	Introduction and Need	5
Softskill Development	Introduction and Need	5
SCADA/HMI Theory	Introduction of SCADA/ HMI	15
	Types of SCADA/ HMI Software	10
	Licencing Concepts	10
	Software Overview	20
	Tag Database Development	30
	Graphic Display Settings	10
	Introduction of Piping and Instrumentation Diagram	10
SCADA/HMI Lab	Introduction of Process and Instrumentation Diagram	10
	Creating your HMI application Graphic Display Setting	20
	Tags, Tag types, Tag creation	20
	Animation, Simple Animation through Memory and system tags	40
	Creation of Buttons	10
	Exercise	20

PLC Theory	Introduction of PLC	15
	Block Diagram of PLC and Role of each module	20
	Types of I/O Modules	20
	I/O Configuration Types	10
	Scan Cycle of PLC	15
	PLC Wiring : Source and Sink Concept	20
	PLC Programming Software Introduction Basic Instructions	20
PLC Lab	PLC Lab Kit Hardware Introduction, control bulder plus and Communication with PLC	20
	PLC programming S/W, Creating your application, Data Files and I/O Addressing	15
	Introduction bit Instructions(XIC, XIO ,OTE) Uploading and Downloading	15
	Concept of Switching function w.r.t to field contacts, Start/Stop Logic and Holding	40
	Realization of logic gates (AND,OR ,NOR etc) by bit Instructions	30
PLC-SCADA Communication	Add data server or OPC Server, Topic creation and verification of communication	15
	Color Animation, Create PBs and Indicators with respect to Start/Stop logic in PLC and verify the communication	15
	PLC Timers and function of Timers	30
	PLC-SCADA Communication	60
	Timer and its Types, Applications	60
	Exercise based on Timers	120
PLC/SCADA/HMI Lab	Scripts and its Types	20
	Popup and Parameter File Creation	20
	Adding Existing HMI components, Expression on animation ,Global Object's Image Adding	20
	Exercise based on PLC Timers and SCADA Animations	60
	Scripts and its Types	40

	Creating Pop up and window navigation Generating Smart Symbol / Break Cell and Make Cell Animations	40
	Indirect addressing and parameter passing	40
PLC / SCADA / HMI Theory / Lab	PLC counters and function of counters	60
	PLC Counters and timers related exercise	120
	Comparison, Move and Logical Instructions	60
	Mathematical Instructions	30
	Exercise	240
SCADA/HMI Theory	Alarms and events	40
	Data logging and trending	50
	Tag data base Importing and exporting	30
	Active-X Control	40
	Recipe Control	45
	Security	35
PLC Theory	Advanced and Program Control Instructions of PLC and related exercise	120
	Introduction of Functional Block Diagram and concept of FBD logic development	120
Project Lab	HMI Development for respective project Note- Screen development, Animation , Tag Data base, popup creation, alarm configuration, Logging and trending, Communication, Launching runtime are covered	300
Project Lab		
Project Lab	Logic Development for respective project	300
Project Lab		
Project Lab	Simulation of project	240
	Acceptance Test	
	Interview Question related to PLC/HMI Project	
Project Lab	Simulation of project	240
	Acceptance Test	
	Interview Question related to PLC/HMI Project	
TEST	PLC SCADA	120
Miner Project	PLC/SCADA BASED	240
	TOTAL TIME IN MINITE	3605

IMS Engineering College, Ghaziabad
Centre of Excellence in Industrial Automation

Details of students registered for Industrial Summer Training PLC/SCADA for first Batch (07/06/2016)

Sr. No		Name of Student
1	RA/TC/IMS/2016/01	Puja Mishra
2	RA/TC/IMS/2016/02	Harshit Paunikar
3	RA/TC/IMS/2016/03	Ramesh Prajapati
4	RA/TC/IMS/2016/04	Manoj Kr Aggrawal
5	RA/TC/IMS/2016/05	Pankaj Singh Sirohi
6	RA/TC/IMS/2016/06	Saurabh Kumar
7	RA/TC/IMS/2016/07	Ashish Kumar
8	RA/TC/IMS/2016/08	Saurabh Kumar Yadav
9	RA/TC/IMS/2016/09	Snehil Singh
10	RA/TC/IMS/2016/10	Satyender Chaudhary
11	RA/TC/IMS/2016/11	Amit Maurya
12	RA/TC/IMS/2016/12	Sandeep Singh
13	RA/TC/IMS/2016/13	Pradumn singh
14	RA/TC/IMS/2016/14	Aditi dixit
15	RA/TC/IMS/2016/15	Subodh Sirohi
16	RA/TC/IMS/2016/16	Kuldeep Singh
17	RA/TC/IMS/2016/17	Joohi Gupta
18	RA/TC/IMS/2016/18	Sri Krishna
19	RA/TC/IMS/2016/19	Anuja
20	RA/TC/IMS/2016/20	Sanjeev

Yashpal Singh
Rhythm Automation Control Pvt Ltd.

IMS Engineering College, Ghaziabad
Centre of Excellence in Industrial Automation

Details of students registered for Industrial Summer Training PLC/SCADA for Second Batch (07/07/2016)

Sr. No		Name of Student
1	RA/TC/IMS/2016/21	Ayush Aggrawal
2	RA/TC/IMS/2016/22	Amrit Prakash
3	RA/TC/IMS/2016/23	Dhananjay Mishra
4	RA/TC/IMS/2016/24	Bipul Kumar
5	RA/TC/IMS/2016/25	Arun Kumar
6	RA/TC/IMS/2016/26	Ajit Singh
7	RA/TC/IMS/2016/27	Devansh Gupta
8	RA/TC/IMS/2016/28	Manish Kumar
10	RA/TC/IMS/2016/29	Himank Pratap Singh
11	RA/TC/IMS/2016/30	Utkarsh Chaturvedi
12	RA/TC/IMS/2016/31	Rakesh Yadav
13	RA/TC/IMS/2016/32	Prince Kumar
14	RA/TC/IMS/2016/33	Karan Raj
15	RA/TC/IMS/2016/34	Prashant
16	RA/TC/IMS/2016/35	Ashok Narayan Tripathi
17	RA/TC/IMS/2016/36	Dinesh Kumar Verma
18	RA/TC/IMS/2016/37	Himanshu Mishra
19	RA/TC/IMS/2016/38	Aseem Kumar
20	RA/TC/IMS/2016/39	Atul Chauhan
21	RA/TC/IMS/2016/40	Satyam Shankhdhar
22	RA/TC/IMS/2016/41	satender pratap singh
23	RA/TC/IMS/2016/42	Avadesh Shahni
24	RA/TC/IMS/2016/43	Sunny Gill

Yashpal Singh
Rhythm Automation Control Pvt Ltd.

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 02 / 09 / 16

RA/TC/IMSEC/2016/005

Certificate

This is to certify that Mr./~~Ms~~ Pankaj Singh Sirohi has successfully completed Industrial Automation Training covering PLC & SCADA From 07/06/16 to 04/07/16 at ABB Industrial Automation Centre, IMS Engineering College, Ghaziabad.

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 02 / 09 / 16

RA/TC/IMCED/2016/004

Certificate

This is to certify that Mr./~~Ms~~...Manoj...Kumar...Aggrawal.....has successfully completed Industrial Automation Training covering.....PLC...&...SCADA..... From.....07/06/16.....to.....04/07/16..... at ABB Industrial Automation Centre, IMS Engineering College, Ghaziabad.

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 02 / 09 / 16

RA/TC/IMSEC/2016/030

Certificate

This is to certify that Mr./~~Ms~~.....Bince Kumar.....has successfully completed Industrial Automation Training covering.....PLC & SCADA..... From.....05/07/16.....to.....02/08/16..... at ABB Industrial Automation Centre, IMS Engineering College, Ghaziabad.

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 02 / 09 / 16

RA/TC/IMSEC/2016/029

Certificate

This is to certify that Mr./Ms. Rakesh Kumar Yadav has successfully completed Industrial Automation Training covering PLC & SCADA From 05/07/16 to 02/08/16 at ABB Industrial Automation Centre, IMS Engineering College, Ghaziabad.

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 02 / 09 / 16

RA/TC/IMSEC/2016/007

Certificate

This is to certify that Mr./~~Ms~~.... Ashish Kumar .....has successfully completed

Industrial Automation Training covering..... PLC & SCADA .....

From...07/06/16.....to.....04/07/16..... at ABB Industrial Automation Centre,

IMS Engineering College, Ghaziabad.

Director
IMSEC, Ghaziabad

Director Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 02 / 09 / 16

RA/TC/IMSEC/2016/008

Certificate

This is to certify that Mr./~~Ms~~. Saurabh Kumar Yadav has successfully completed Industrial Automation Training covering PLC & SCADA From 07/06/16 to 04/07/16 at ABB Industrial Automation Centre, IMS Engineering College, Ghaziabad.

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 02 / 09 / 16

RA/TC/IMSEC/2016/006

Certificate

This is to certify that Mr./~~Ms~~ Saurabh Kumar has successfully completed Industrial Automation Training covering PLC & SCADA From 07/06/16 to 04/07/16 at ABB Industrial Automation Centre, IMS Engineering College, Ghaziabad.

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 02 / 09 / 16

RA/TC/IMSEC/2016/024

Certificate

This is to certify that Mr./~~Ms~~ Ajeet Singh has successfully completed Industrial Automation Training covering PLC & SCADA From 05.07.16 to 02.08.16 at ABB Industrial Automation Centre, IMS Engineering College, Ghaziabad.

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 02 / 09 / 16

RA/TC/IMSEC/2016/016

Certificate

This is to certify that Mr./~~Ms~~ Kuldeep Singh has successfully completed Industrial Automation Training covering PLC & SCADA From 07/06/16 to 04/07/16 at ABB Industrial Automation Centre, IMS Engineering College, Ghaziabad.

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

Rhythm Automation
ISO 9001:2008
Certified Company

ABB
Authorised Channel Partner

IMS Engineering College
NAAC Accredited with A Grade

Date:- 02 / 09 / 16

RA/TC/IMSEC/2016/013

Certificate

This is to certify that Mr./~~Ms~~. Pradeep Kumar Singh has successfully completed Industrial Automation Training covering PLC & SCADA From 07/06/16 to 04/07/16 at ABB Industrial Automation Centre, IMS Engineering College, Ghaziabad.

Director
IMSEC, Ghaziabad

Director - Training
Rhythm Automation Learning Centre

IMS ENGINEERING COLLEGE

FORMATS	IMSEC/QF/08b
	Page 1 of 1
	Issue No: 02
Time Table for Students	Issue Date: 1 May 2010
Prepared by: MR	Approved by: Director

Academic Session: 2017-2018 **Year: 4th** **Semester:VII** **Branch: EN** **Section: EN-1 4th Year**

ROOM NO: C-409 **W.E.F. 23-08-2017**

Saroj Kumar

	1 8:50 - 9:50	2 9:50 - 10:40	3 10:40 - 11:30	4 11:30 - 12:20	5 12:20 - 1:10	6 1:10 - 2:00	7 2:00 - 2:50	8 2:50 - 3:40	9 3:40 - 4:30
Mo	NEN-702(L) GS	SOFT SKIL Ms. Bhawani Shankar		NEN-031(L) SK	NEN-701(L) AKG	L	NOE-071(L) PN	NEC-702A(L) MA	NEN-702(L) GS
Tu	NEN-031(L) SK	NEC-702A(L) MA	NEN-702(L) GS	APTITUDE Mr. Suneel Palia		U	NOE-071(L) PN	NEC-752B(P) B1 MA / SB EC Lab-4 NEN-753(P) B2 GS / PN	
We	NEN-701(L) AKG	APTITUDE Mr. Suneel Palia		NEN-702(L) GS	NEN-702(L) GS	N	NEN-701(L) AKG	NEN-751(P) B1 SK / BRG B-003 NEC-752B(P) B2 MA / SB EC Lab-4	
Th	NEC-702A(L) MA	NEN-701(L) AKG	NOE-071(L) PN	NEN-701(L) AKG	NEC-702A(L) MA	C	NEN-031(L) SK	NEN-753(P) B1 GS / AKG NEN-751(P) B2 SK / BRG B-003	
Fr						H			

Timetable generated:19-09-2017 aSc Timetables

Sub. Code	Subject Name	Name of Faculty	Sub. Code	Subject Name	Name of Faculty
NOE-071(L)	EDP	Mr. Pankaj Negi	NEN-754(P)	Project	Mr. Atul K. Kushwaha
NEN-701(L)	Electric Drives	Mr. Abhishek K. Gupta	NEC-752B(P)	ADC Lab	Mr. Mayank Aggarwal, Sandeep Bha
NEN-031(L)	PSOC	Mr. Saroj Kumar	NEN-753(P)	Industrial Training	Mr. Gyanesh Singh, Mr. Abhishek K
NEN-702(L)	PSP	Mr. Gyanesh Singh	APTITUDE	APTITUDE	Mr. Suneel Palia
NEC-702A(L)	ADC	Mr. Mayank Aggarwal	SOFT SKIL	SOFT SKIL	Ms. Bhawani Shankar
NEN-751(P)	Power System Lab	Mr. Saroj Kumar, Mr. Bulle Ram Gol			

Mr. Saroj Kumar
Time Table Incharge

Class Coordinator:Mr. Atul Kushwaha (Mo: 9958405051)
Mentor B1 Batch:Mr. Pankaj Negi (Mo: 9555750582)
Mentor B2 Batch:Mr. Atul Kushwaha (Mo: 9958405051)

Rishi Asthana

Prof. (Dr.) Rishi Asthana
HOD EN

IMS ENGINEERING COLLEGE	IMSEC/QF/08b
FORMATS	Page 1 of 1
	Issue No: 02
Time Table for Students	Issue Date: 1 May 2010
Prepared by: MR	Approved by: Director

Academic Session: 2017-2018 **Year: 4th** **Semester:VII** **Branch: EN** **Section: EN-2 4th Year**

ROOM NO: C-410 **W.E.F. 23-08-2017**

Saroj Kumar

	1 8:50 - 9:50	2 9:50 - 10:40	3 10:40 - 11:30	4 11:30 - 12:20	5 12:20 - 1:10	6 1:10 - 2:00	7 2:00 - 2:50	8 2:50 - 3:40	9 3:40 - 4:30
Mo	NEN-701(L) AKG	NEN-701(L) AKG	NOE-071(L) MA	SOFT SKIL Ms. Bhawani Shankar		L	NEN-031(L) SK	NEN-751(P) B1 SK / BRG B-003 NEC-752B(P) B2 PN / SB EC Lab-4	
Tu	NEC-702A(L) PN	APTITUDE Mr. Jitesh Bohra		NEN-702(L) RS	NEC-702A(L) PN	U	NEN-701(L) AKG	NEN-753(P) B1 SA / VK NEN-751(P) B2 SK / BRG B-003	
We	NEN-031(L) SK	NEN-701(L) AKG	NEN-702(L) RS	APTITUDE Mr. Jitesh Bohra		N	NOE-071(L) MA	NEN-702(L) RS	NEC-702A(L) PN
Th	NEN-702(L) RS	NEN-031(L) SK	NEN-702(L) RS	NEC-702A(L) PN	NEN-701(L) AKG	C	NOE-071(L) MA	NEC-752B(P) B1 PN / SB EC Lab-4 NEN-753(P) B2 SA / SN	
Fr						H			

Timetable generated:19-09-2017 aSc Timetables

Sub. Code	Subject Name	Name of Faculty	Sub. Code	Subject Name	Name of Faculty
NOE-071(L)	EDP	Mr. Mayank Aggarwal	NEN-754(P)	Project	Ms. Annu Govind
NEN-701(L)	Electric Drives	Mr. Abhishek K. Gupta	NEC-752B(P)	ADC Lab	Mr. Pankaj Negi, Sandeep Bhardwa
NEN-031(L)	PSOC	Mr. Saroj Kumar	NEN-753(P)	Industrial Training	Mr. Sameer Anand, Mr. Vijay Kumar
NEN-702(L)	PSP	Mr. Raj Kumar Singh	APTITUDE	APTITUDE	Mr. Jitesh Bohra
NEC-702A(L)	ADC	Mr. Pankaj Negi	SOFT SKIL	SOFT SKIL	Ms. Bhawani Shankar
NEN-751(P)	Power System Lab	Mr. Saroj Kumar, Mr. Bulle Ram Gol			

Mr. Saroj Kumar
Time Table Incharge

Class Coordinator:Ms. Snigdha Chaturvedi (Mo: 8527257735)
Mentor B1 Batch:Ms. Snigdha Chaturvedi (Mo: 8527257735)
Mentor B2 Batch:Mr. Sameer Anand (Mo: 9717948129)

Rishi Asthana

Prof. (Dr.) Rishi Asthana
HOD EN

IMS ENGINEERING COLLEGE	IMSEC/QF/08b
FORMATS	Page 1 of 1
	Issue No: 02
Time Table for Students	Issue Date: 1 May 2010
Prepared by: MR	Approved by: Director

TIME TABLE

Academic Session: 2018-2019 **Year: 4th** **Branch: ME** **Semester: 7th** **Section:ME1**

ROOM NO: B-216 **W.E.F. 20/08/18**

abc school

	1 8:50 - 9:50	2 9:50 - 10:50	3 10:50 - 11:50	4 11:50 - 12:50	5 12:50 - 1:50	6 1:50 - 2:50	7 2:50 - 3:50	8 3:50 - 4:50
Mo	NME-751 CAD LAB B1 RR / AS NME-752 AUTO LAB B2 SK		NME-701 RR	Aptitude		Aptitude	NME-753 S0S / MS	NME-702 SK
Tu	NME-752 AUTO LAB B1 SK NME-751 CAD LAB B2 RR / AS		NME-701 RR	Soft Skill		Soft Skill	NME-041 PG B-216 B1 NME-044 MS B-220 B2	NME-032 VB B-213 G1 NME-031 AS B-216 G2
We	NME-041 PG B-216 B1 NME-044 MS B-220 B2	Aptitude		NME-701 RR		NOE-071 AKP	NME-702 SK	NME-032 VB B-220 G1 NME-031 AS B-216 G2
Th	NME-032 VB B-220 G1 NME-031 AS B-216 G2	NOE-071 AKP	NME-702 SK	NME-701 RR		NME-754		SK
Fr	NME-032 VB B-220 G1 NME-031 AS B-216 G2	NOE-071 AKP	NME-702 SK	NME-041 PG B-216 B1 NME-044 MS B-220 B2		NME-754		SK
Sa								

Timetable generated:18-08-2018

* To Be checked and taught as per university syllabus.

aSc Timetables

LEGENDS	SUBJECT NAME	LEGENDS	SUBJECT NAME
Mr. AMIT PANDEY(AKP)	Entrepreneurship Development (NOE-071)	Mr. SUNIL KUMAR(SK)	Project (NME-754)
Ms.VIVEK BHARDWAJ(VB)	Project Management (NME-032)	Mr. SHIV OM SHARMA(SOS), Mrs. MUBINA SHEKH(MS)	INDUSTRIAL TRG. (NME-753)
Mr. PANKUL GOEL(PG)	Total Quality Management (NME-041)	Mrs. MUBINA SHEKH(MS)	Automation and Robotics (NME-044)
Mr. RAVI RANJAN(RR)	Computer Aided Design (NME-701)	Mr. ABHISHEK SAXENA(AS)	Computer Aided Manufacturing (NME-031)
Mr. SUNIL KUMAR(SK)	Automobile Engineering (NME-702)		Aptitude
Mr. RAVI RANJAN(RR), Mr. ABHISHEK SAXENA(AS)	CAD/CAM Lab (NME-751)		Soft Skill
Mr. SUNIL KUMAR(SK)	I.C.Engine _Automobile Lab (NME-752)		

Class Coordinator: Mrs. MUBINA SHEKH(MS)

HOD,ME **DEAN ACADEMICS**

IMS ENGINEERING COLLEGE	IMSEC/QF/08b
FORMATS	Page 1 of 1
	Issue No: 02
Time Table for Students	Issue Date: 1 May 2010
Prepared by: MR	Approved by: Director

TIME TABLE

Academic Session: 2018-2019 **Year: 4th** **Branch: ME** **Semester: 7th** **Section:ME2**

ROOM NO: B-218 **W.E.F. 20/08/18**

abc school

	1 8:50 - 9:50	2 9:50 - 10:50	3 10:50 - 11:50	4 11:50 - 12:50	5 12:50 - 1:50	6 1:50 - 2:50	7 2:50 - 3:50	8 3:50 - 4:50
Mo	NME-701 VKS	Aptitude		NME-702 VKJ		NME-032 KG B-218 G1 NME-031 PG B-211 G2	NME-751 CAD LAB B1 AS / AKP NME-752 AUTO LAB B2 AP	
Tu	NME-702 VKJ	NME-701 VKS	NME-032 KG B-218 G1 NME-031 PG B-220 G2	NME-041 PC B-218 B1 NME-044 SS B-220 B2		NME-754 S0S		
We	NME-702 VKJ	NME-753 KG / AP	NOE-071 S0S	Aptitude		Aptitude	NME-701 VKS	NME-041 PC B-218 B1 NME-044 SS B-211 B2
Th	NME-032 KG B-218 G1 NME-031 PG B-215 G2	NME-701 VKS	NME-752 AUTO LAB B1 AP NME-751 CAD LAB B2 AS / AKP			NOE-071 S0S	Soft Skill	
Fr	NME-032 KG B-218 G1 NME-031 PG B-215 G2	NME-041 PC B-218 B1 NME-044 SS B-220 B2	NOE-071 S0S	NME-702 VKJ		NME-754 S0S		
Sa								

Timetable generated:18-08-2018

* To Be checked and taught as per university syllabus.

aSc Timetables

LEGENDS	SUBJECT NAME	LEGENDS	SUBJECT NAME
Mr. SHIV OM SHARMA(SOS)	Entrepreneurship Development (NOE-071)	Mr. SHIV OM SHARMA(SOS)	Project (NME-754)
Ms. KALPANA GUPTA(KG)	Project Management (NME-032)	Ms. KALPANA GUPTA(KG), Mr. ARVINDA Kr. PANDIT	INDUSTRIAL TRG. (NME-753)
Mr. PRASOON CHOUDHARY(PC)	Total Quality Management (NME-041)	Mr. SUMIT SHARMA(SS)	Automation and Robotics (NME-044)
Dr. V. K. SAINI(VKS)	Computer Aided Design (NME-701)	Mr. PANKUL GOEL(PG)	Computer Aided Manufacturing (NME-031)
Mr. VIVEK Kr. JAIN(VKJ)	Automobile Engineering (NME-702)		Aptitude
Mr. ABHISHEK SAXENA(AS), Mr. AMIT PANDEY(AKP)	CAD/CAM Lab (NME-751)		Soft Skill
Mr. ARVINDA Kr. PANDIT(AP)	I.C.Engine _Automobile Lab (NME-752)		

Class Coordinator: Mr. SHIV OM SHARMA(SOS)

HOD,ME **DEAN ACADEMICS**

IMS ENGINEERING COLLEGE	IMSEC/QF/08b
FORMATS	Page 1 of 1
	Issue No: 02
Time Table for Students	Issue Date: 1 May 2010
Prepared by: MR	Approved by: Director

TIME TABLE

Academic Session: 2018-2019 **Year: 4th** **Branch: ME** **Semester: 7th** **Section:2ME**

ROOM NO: B-214 **W.E.F. 20/08/18**

abc school

	1 8:50 - 9:50	2 9:50 - 10:50	3 10:50 - 11:50	4 11:50 - 12:50	5 12:50 - 1:50	6 1:50 - 2:50	7 2:50 - 3:50	8 3:50 - 4:50
Mo	NME-032 YKY B-215 G1 NME-031 PG B-214 G2	NOE-071 S0S	NME-751 CAD LAB B1 PG / YKY NME-752 AUTO LAB B2 AKP			NME-702 SK	Aptitude	
Tu	NME-753 PC / OPU	Soft Skill		NME-702 SK		NME-701 VKS	NME-041 AP B-214 B1 NME-044 MS B2	NME-701 VKS
We	NME-041 AP B-214 B1 NME-044 MS B2	NOE-071 S0S	NME-752 AUTO LAB B1 AKP NME-751 CAD LAB B2 YKY / PG			NME-032 YKY B-215 G1 NME-031 PG B-214 G2	Aptitude	
Th	NME-701 VKS	NME-032 YKY B-220 G1 NME-031 PG B-214 G2	NOE-071 S0S	NME-702 SK		NME-754		AP
Fr	NME-702 SK	NME-701 VKS	NME-032 YKY B-215 G1 NME-031 PG B-214 G2	NME-041 AP B-214 B1 NME-044 MS B2		NME-754		AP
Sa								

Timetable generated:18-08-2018

* To Be checked and taught as per university syllabus.

aSc Timetables

LEGENDS

Mr. SHIV OM SHARMA(SOS)
Mr. YOGESH YADAV(YKY)
Mr. ARVINDA Kr. PANDIT(AP)
Dr. V. K. SAINI(VKS)
Mr. SUNIL KUMAR(SK)
Mr. PANKUL GOEL(PG), Mr. YOGESH YADAV(YKY)
Mr. AMIT PANDEY(AKP)

SUBJECT NAME

Entrepreneurship Development (NOE-071)
Project Management (NME-032)
Total Quality Management (NME-041)
Computer Aided Design (NME-701)
Automobile Engineering (NME-702)
CAD/CAM Lab (NME-751)
I.C.Engine _Automobile Lab (NME-752)

LEGENDS

Mr. ARVINDA Kr. PANDIT(AP)
Mr. PRASOON CHOUDHARY(PC), Mr. O.P. UMRAO
Mrs. MUBINA SHEKH(MS)
Mr. PANKUL GOEL(PG)

SUBJECT NAME

Project (NME-754)
INDUSTRIAL TRG. (NME-753)
Automation and Robotics (NME-044)
Computer Aided Manufacturing (NME-031)
Aptitude
Soft Skill

Class Coordinator: Mr. ARVINDA Kr. PANDIT(AP)

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CDC Structure
Major Recruiters
Placement Records

Placement Records 2020-2021

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aashish sharma Biotechnology square yards	**deepanita bux** Biotechnology square yards	**deepanita bux** Biotechnology HealthPlix	**kashaf rayees** Biotechnology HealthPlix	**kashaf rayees** Biotechnology square yards
silvi chaudhary Biotechnology square yards	**silvi chaudhary** Biotechnology HealthPlix	**vikrant tiwari** Biotechnology HealthPlix	**vikrant tiwari** Biotechnology square yards	**akancha katiyar** Biotechnology HealthPlix
akanksha singh Biotechnology HealthPlix	**akash pandey** Biotechnology HealthPlix	**akruti singh** Biotechnology HealthPlix	**anushka tyagi** Biotechnology HealthPlix	**ayushi** Biotechnology Health

durgesh kumar rai
Biotechnology
HealthPlix

sifa khan
Biotechnology
HealthPlix

vishakha singh
Biotechnology
HealthPlix

vivek singh
Biotechnology
HealthPlix

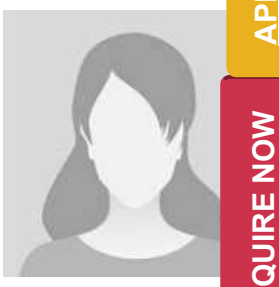
yash saigal
Biotechnology
HealthPl

mrinal mishra
Biotechnology
HealthPlix

mrinal mishra
Biotechnology
GINGER

nitin rathi
Biotechnology
GINGER

romil chaudhary
Biotechnology
GINGER



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Placements
CDC Team
CDC Structure
Major Recruiters
Placement Records

Placement Records 2020-2021

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utkarsh upadhyay
Computer-science-and-engineering

aakash kumar
Computer-science-and-engineering

abhinav kaushik
Computer-science-and-engineering

achintya jaiswal
Computer-science-and-engineering

achintya jaiswal
Computer-science-and-engineering

akanksha
Computer-science-and-engineering

akshita
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aman gupta
Computer-science-and-engineering

aman kumar singh
Computer-science-and-engineering

aman tyagi
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aman verma
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aman verma
Computer-science-and-engineering

anamika awasthi
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ankit mishra
Computer-science-and-engineering

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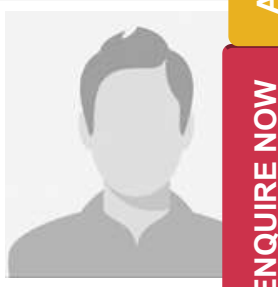

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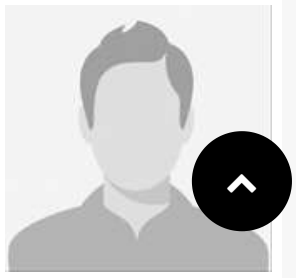

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- Convocation Proceeding
- NAAC
- NIRF

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Major Recruiters
Placement Records

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Electronics-and-communication

akanksha singh
Electronics-and-communication

aman singh aswal
Electronics-and-communication

anmol latiyan
Electronics-and-communication

anushk srivastava
Electronics-and-communication

anushk srivastava
Electronics-and-communication

arihant jain
Electronics-and-communication

arihant jain
Electronics-and-communication

ashish kumar dubey
Electronics-and-communication

ayush awasthi
Electronics-and-communication

janmejay singh chauhan
Electronics-and-communication

jaydeep agarwal
Electronics-and-communication

km.shivangi agrawal
Electronics-and-communication

kuldeep singh
Electronics-and-communication

nishi gupta
Electronics-and-communication

paras dhankar
Electronics-and-communication

rahul kumar maurya
Electronics-and-communication

raushan kumar
Electronics-and-communication

sachin pa
Electronics-and-communication

sarthak
Electronics-and-communication

saurabh suman
Electronics-and-communication

shaksham chauhan
Electronics-and-communication

shivangi nirwan
Electronics-and-communication

shivani agrawal
Electronics-and-communication

shubham dash
Electronics-and-communication

shubham kumar
Electronics-and-communication

shweta sharma
Electronics-and-communication

vashu sharma
Electronics-and-communication

vashu sharma
Electronics-and-communication

sanjay ojha
Electronics-and-communication

saksham chauhan
Electronics-and-communication

harshit tomar
Electronics-and-communication

sahil tyagi
Electronics-and-communication

saurabh suman
Electronics-and-communication

sanjay ojha
Electronics-and-communication

shubham kaushik
Electronics-and-communication

suraj sharma
Electronics-and-communication

shaksham chauhan
Electronics-and-communication

pranav shukla
Electronics-and-communication

piyush kumar singh
Electronics-and-communication

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akshit chaudhary
Information-technology

aman srivastava
Information-technology

arpit sharma
Information-technology

arushi sanjay
Information-technology

aryan mishra
Information-technology

ashutosh mishra
Information-technology

ayush singh
Information-technology

ayush singh
Information-technology

ayush singh
Information-technology

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Information-technology

diksha singh
Information-technology

harshit sharma
Information-technology

jatin arora
Information-technology

jatin trivedi
Information-technology

kajal khanna
Information-technology

kajal khanna
Information-technology

nakul mitra
Information-technology

nakul mitra
Information-technology

nandkishore mishra
Information-technology

navneet vashisth
Information-technology

nirmit srivastava
Information-technology

nirmit srivastava
Information-technology

nitin saxena
Information-technolo

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Information-technology

palak kapoor
Information-technology

palak kapoor
Information-technology

palak kapoor
Information-technology

palak kapoor
Information-technolo

prince chauhan
Information-technology

prince chauhan
Information-technology

rajvikram saxena
Information-technology

rajvikram saxena
Information-technology

rakhi singh
Information-technology

rakhi singh
Information-technology

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This is to certify that **Mrs. Annu Govind** *Assistant Professor ,IMS engineering college* has successfully completed 5 days (From **02 july,2018** to **06 july,2018**) Training program at 220kv Substation Muradnagar .
During training period, we found his performance & conduct satisfactory.

We wish him all the best for his future endeavor.

Assistant Engineer
Elect. Test & Commissioning
220 K.V. Sub-Station Muradnagar (GZP)

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This is to certify that *Ms. Annu Govind*

Associate Professor, IMS Engineering College, Ghaziabad

has successfully completed one week Faculty Development Program on

"Applications of MATLAB/Labview in Engineering"

conducted by the Department of Electrical & Electronics Engineering, ABES Engineering College, Ghaziabad under TEQIP-III Dr. A.P.J. Abdul Kalam Technical University, Uttar Pradesh, Lucknow.

Shilpa Sambhi / Dr. Preeti Coordinator, FDP	Prof. (Dr.) Hemant Ahuja Head (EN)	Prof. Gajendra Singh Director

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Mr. Varun Kumar Singhal

from

IMS Ghaziabad

has participated

in

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(In association with Dr. A.P.J. Abdul Kalam Technical University, Lucknow)

on

"Advanced Wireless Sensor Network"

held from July 9th to 13th, 2018.

FDP Coordinator | Programme Coordinator | Director

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Dr. Sanjeev Manhas
Principal Investigator
E&ICT Academy, IIT Roorkee

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One Week Faculty Development Program

8th - 12th July, 2019

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attended one week Faculty Development Program on

"Power Electronics in Renewable Energy"

sponsored by Dr. A.P.J. AKTU, Lucknow, under TEQIP-III, held at ABES Engineering College, Ghaziabad (U.P.)

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Convener & Head (EN)

Prof. (Dr.) Vijay Athavale
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in Rural/Urban Development/Planning".

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Director	Convener-FDP & HOD-ECE	Vice-chancellor
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Prof. S. K. Singh
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Participated in AICTE recognized Short Term Course

on

Institutional Accreditation (NBA Guidelines) and Quality Management through ICT

conducted by

Media and Continuing Education Centre

from

18.07.2016 to 22.07.2016 (One Week)

at

IMS Engineering College, Ghaziabad (UP)

CHANDIGARH

Coordinator

Director

Short Term Course

on

CONTROL STRATEGIES FOR POWER QUALITY IMPROVEMENT

January 12-16, 2018

Organized by

Department of Electrical Engineering
National Institute of Technology Kurukshetra

Certificate of Participation

This is to certify that Prof./Dr./Mr./Ms. VIJAY KUMAR *of* IMS ENGINEERING COLLEGE GHAZIABAD *attended Short Term Course organized by Department of Electrical Engineering, National Institute of Technology Kurukshetra during 12-16 January, 2018.*

Dr. Yashpal
(Coordinator)

Dr. J.S. Lather
(Convener)

Department of Electrical Engineering
National Institute of Technology Kurukshetra

Certificate of Participation

This is to Certify that Dr./Mr./Mrs./Ms. Vijay Kumar

of IMS Engineering College, Ghaziabad (U.P.)

has attended one week Short Term Course on

"FACTs in Renewable Energy Systems"

during December 29, 2017 to January 2, 2018

in the Electrical Engineering Department

at National Institute of Technology Kurukshetra

(Dr. Yash Pal)
Convener

(Dr. Anil K Dahiya)
Coordinator

Sr. No. 43095

NATIONAL INSTITUTE OF TECHNOLOGY, KURUKSHETRA

Ph.D. Course Work

Passing Certificate cum Grade Card

It is to certify that **Mr. Vijay Kumar S/o Sh. Raj Nath, Roll No. 6140092** has successfully completed his Ph.D. Course Work in the **School of Renewable Energy and Efficiency** in **Nov./Dec. 2014** of which the details are given below:-

Consolidated Grade Sheet

Sr. No.	Subject Code & Subject Name	Credit	Grade
1	EE535T Power System Dynamics and Stability	3	A+
2	EE537T Power System Planning	3	A
3	EE543T PSO in Restructured Environment	3	B
4	EE563T Advanced Theory of Electric Machinery	3	A
Total Credit and CG		**12**	**108**
SGPA/CGPA		**9.0000**	

Prof. In-charge (Result)

Controller of Examinations

Dated: 24 NOV 2015

Department of Electrical Engineering
National Institute of Technology Kurukshetra

Certificate of Participation

This is to Certify that Dr./Mr./Mrs./Ms. Vijay Kumar

of IMS Engineering College, Ghaziabad (U.P.)

has attended one week Short Term Course on

"FACTs in Renewable Energy Systems"

during December 29, 2017 to January 2, 2018

in the Electrical Engineering Department

at National Institute of Technology Kurukshetra

(Dr. Yash Pal)
Convener

(Dr. Anil K Dahiya)
Coordinator

KIET
GROUP OF INSTITUTIONS

(A Technical Campus approved by AICTE &
Affiliated to Dr. A.P.J. Abdul Kalam Technical Univ., Lucknow)
Accredited by NAAC with Grade 'A' (5 yrs)

Certificate of Participation

This is to certify that

Mr. Mayank Agarwal

from

IMS Ghaziabad

has participated

in

One Week Workshop

(In association with Dr. A.P.J. Abdul Kalam Technical University, Lucknow)

on

"Advanced Wireless Sensor Network"

held from July 9th to 13th, 2018.

FDP Coordinator | Programme Coordinator | Director

ONE WEEK FACULTY DEVELOPMENT PROGRAMME

ON

RECENT ADVANCES IN DISTRIBUTION GENERATION SYSTEMS AND MANAGEMENT (RADGSM-18)

APRIL 02-06, 2018

Sponsored by TEQIP-III

Organized by

Department of Electrical Engineering, Kamla Nehru Institute of Technology

Sultanpur (U.P.)-228118, India

CERTIFICATE OF PARTICIPATION

It is to certify that Mr./Ms./Dr./Prof. RATEEV KUMAR CHAUHAN ..... *from* IMS, GHAZIABAD. *has participated in one week faculty development programme " Recent Advances in Distribution Generation Systems and Management (RADGSM-18)" held from 02-06 April, 2018.*

Dr. Yogesh K. Chauhan	Prof. A. S. Pandey	Prof. A. K. Singh	Prof. J. P. Pandey
Coordinator	Head, EED	Coordinator,TEQIP-III	Director

ELECTRONICS & ICT ACADEMY
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

CERTIFICATE

One Week Faculty Development Programme
on
AI and Machine Learning

This is to certify that **Sulekha Saxena** from **IMS Engineering College, Ghaziabad, U. P.** has participated in the Faculty Development Programme on ***"AI and Machine Learning"*** jointly organised by Electronics and ICT Academies through National Knowledge Network under the **"Scheme of financial assistance for setting up of Electronics and ICT Academies"** by the Ministry of Electronics and Information Technology (MeitY), Government of India from 04 June-08 June, 2018 at C-DAC Noida.

Dr. Sanjeev Manhas
Principal Investigator
E&ICT Academy, IIT Roorkee

Dr. Sunita Prasad
Local Coordinator
C-DAC Noida

Finland Labs

In Association With

National Social Summit
The Annual Social Festival of IIT Roorkee

Certificate of Participation

This is to certify that ***Dr Rudra Pratap Singh Chauhan (Professor)***

of ***IMS Engineering College***

has participated in the 10 Days Instructor Led Live Online ***Faculty Development Program*** *On*
Artificial Intelligence & Machine Learning Using Python
held during 18th - 27th May 2020

Organized by

Finland Labs (A Unit of Revert Technology Pvt. Ltd.)
In Association with
National Social Summit, IIT Roorkee

For Revert Technology Pvt. Ltd.
Director
Revert Technology Pvt. Ltd.
Director

Finland Labs

In Association With

National Social Summit
The Annual Social Festival of IIT Roorkee

Certificate of Participation

This is to certify that ***Dr Rudra Pratap Singh Chauhan (Professor)***

of ***IMS Engineering College, Ghaziabad***

has participated in the 5 Days Instructor Led Live Online ***Faculty Development Program***
On ***Internet of Things (IOT) Using Amazon AWS***
held during 01st - 05th June 2020

Organized by

Finland Labs (A Unit of Revert Technology Pvt. Ltd.)
In Association with
National Social Summit, IIT Roorkee

For Revert Technology Pvt. Ltd.
Director
Revert Technology Pvt. Ltd.
Director

Technical Education Quality Improvement Programme

MHRD
GOVERNMENT OF INDIA

THE WORLD BANK

Six Days Online Faculty Development Program on Recent Trends in Electronics Engineering

Organized by Department of Electrical & Electronics Engineering
Lok Nayak Jai Prakash Institute of Technology, Chapra

Certificate

Balwant Singh

This is to certify that .....

has successfully completed

The Online FDP held under TEQIP-III Project during 15-20th June 2020.

Rishikesh Choudhary
H.O.D, EEED
LNJPIT Chapra

Zafar Ayub Ansari
TEQIP Coordinator
LNJPIT Chapra

Dr. S.N.Sharma
Principal
LNJPIT Chapra

Sri Ramakrishna Engineering College

Coimbatore

CERTIFICATE OF COMPLETION

This is to certify that

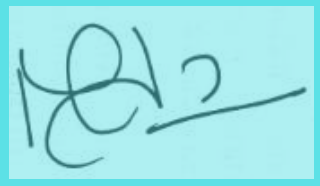
Dr Neeraj Jain

was an active participant in WEBLOKHA-2020,a webinar series on

RECENT TRENDS IN COMMUNICATION AND SIGNAL PROCESSING

offered by Department of Electronics and Communication Engineering, during 15th - 19th June 2020.

Dr.N. SATHISH KUMAR
Professor/ ECE



Dr. M. JAGADEESWARI
Professor & Head/ ECE

Dr. N.R. ALAMELU
Principal

Sri Ramakrishna Engineering College

Coimbatore

CERTIFICATE OF COMPLETION

This is to certify that

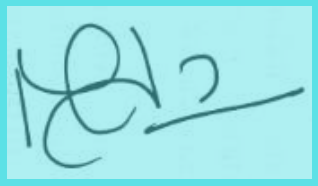
Mayurika Saxena

was an active participant in WEBLOKHA-2020,a webinar series on

RECENT TRENDS IN COMMUNICATION AND SIGNAL PROCESSING

offered by Department of Electronics and Communication Engineering, during 15th - 19th June 2020.

Dr.N. SATHISH KUMAR
Professor/ ECE



Dr. M. JAGADEESWARI
Professor & Head/ ECE

Dr. N.R. ALAMELU
Principal

Dr. B R Ambedkar National Institute of Technology, Jalandhar
GT Road Bye Pass, Jalandhar-144011(Punjab)

ACSIT/ECE/162

Department of Electronics & Communication Engineering

TEQIP-III Sponsored One Week Online Short Term Course
on
Advances in Communication systems for Integrated Technology

CERTIFICATE

OF PARTICIPATION

This is to certify that

Jaya Nidhi Vashishtha

IMS ENGINEERING COLLEGE GHAZIABAD

has participated in this course from **July 6-10, 2020.**

Dr Deepti Kakkar Coordinator	Dr Ashish Raman Coordinator	Dr R K Sunkaria Convener

*ID: L201906BC7E

ELECTRONICS & ICT ACADEMY
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

CERTIFICATE

Faculty Development Programme
on
Machine Learning and Data Analytics Using Python

This is to certify that **Praveen Kumar** from **IMS Engineering College, Ghaziabad** has participated in faculty development programme (online live instructor-led) on "Machine Learning and Data Analytics Using Python" conducted by Electronics and ICT Academy, IIT Roorkee from 05 May – 13 May, 2020.

Dr. Sanjeev Manhas
Principal Investigator
E&ICT Academy, IIT Roorkee

Dr. R. Balasubramanian
Local Coordinator
E&ICT Academy, IIT Roorkee

This certificate has a unique ID and can be verified from E&ICT Academy IIT Roorkee

TEQIP-3
Technical Education Quality Improvement Programme

MHRD
GOVERNMENT OF INDIA

THE WORLD BANK

Six Days Online Faculty Development Program on Recent Trends in Electronics Engineering

Organized by Department of Electrical & Electronics Engineering

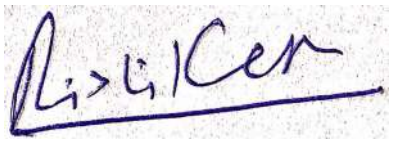
Lok Nayak Jai Prakash Institute of Technology, Chapra

Certificate

This is to certify that ..... Praveen Chaurasia .....

has successfully completed

The Online FDP held under TEQIP-III Project during 15-20th June 2020.



Rishikesh Choudhary
H.O.D, EEED
LNJPIT Chapra

Zafar Ayub Ansari
TEQIP Coordinator
LNJPIT Chapra

Dr. S.N.Sharma
Principal
LNJPIT Chapra

FACULTY DEVELOPMENT PROGRAMME
on

RECENT TRENDS IN VLSI, RF & WIRELESS COMMUNICATION (RTVRWC – 2019)

Sponsored by AKTU Lucknow, under TEQIP III

Organized by

ELECTRONICS ENGINEERING DEPARTMENT

RAJKIYA ENGINEERING COLLEGE SONBHADRA

JULY 01-05, 2019

CERTIFICATE OF PARTICIPATION

This is to certify that

Praveen Chaurasia of IMS Engineering College, Ghaziabad has participated in One Week Faculty Development Programme on **"RECENT TRENDS IN VLSI, RF & WIRELESS COMMUNICATION (RTVRWC – 2019)"** during **July 01-05, 2019** at Rajkiya Engineering College Sonbhadra.

Dr. Himanshu Katiyar	Dr. D.K. Tripathi	Prof. V. K. Giri
Convener	Chairman & HELD	Director

Roll No:NPTEL19HS34S21290374

To PANKAJ GOEL
B-915, GAUR HOMES, GOVINDPURAM
GHAZIABAD
UTTAR PRADESH
201013
PH. NO :9555566989

No. of weeks of NPTEL Courses	Equivalence of NPTEL course with regular FDP
4	$\frac{1}{2}$ FDP of one week
8	Full FDP of one week
12	$1\frac{1}{2}$ FDP

Duration of NPTEL course: 4 Weeks

NPTEL-AICTE
Faculty Development Programme

(Funded by the Ministry of HRD, Govt. of India)

This certificate is awarded to

PANKAJ GOEL

for successfully completing the course

Body Language: Key to Professional Success

with a consolidated score of **68** %

Prof. Andrew Thangaraj
NPTEL Coordinator
IIT Madras

(Jul-Aug 2019)

Prof. Dileep N. Malkhede
Advisor-I (Research, Institute & Faculty Development)
All India Council for Technical Education

Roll No: NPTEL19HS34S21290374

To validate and check scores: http://nptel.ac.in/noc

The candidate has studied the above course through MOOCs mode, has submitted online assignments and passed proctored exams.
This certificate is therefore acceptable for promotions under CAS as per AICTE notifications dated 24th July 2018, similar to other refresher / orientation courses.
F.No. AICTE / RIFD / FDP through MOOCs / 2017-18

2018

steag

STEAG Energy Services (India) Pvt. Ltd. | A- 29, Sector – 16, Noida – 201 301 | India

Praveen Kr. Ambastha
Addl. General Manager- PADO
System Technologies
Phone +91 120 4625 345
Fax +91 120 4625 100
Mobile +91 9810252690

p.ambastha@steag.in

July 9, 2018

TO WHOMSOEVER IT MAY CONCERN

This is to certify that Dr. Suneel Kumar Kalla, HOD IMS Engineering College, Ghaziabad (U.P) - 201009 visited our Noida Office from 04/07/2018 to 09/07/2018 (5 Days).

During his visit he has seen

- Power Plant Optimization software PADO (Performance Analysis & Diagnostic Optimization) for NTPC & Non NTPC Power Plant. which is used to enhance efficiency of Power Plant.
- Overview of Ebsilon software & its use to Design a Power Plant.
- Overview of latest configuration of 800 MW Super Critical Plant.
- Steag 430 MW CCGT Simulator which is used to give training to Power Plant Engineer.

Yours sincerely

Praveen Ambastha

Praveen Kr. Ambastha

ABES Engineering College

Estd. 2000

Department of Mechanical Engineering

Technical Education Quality Improvement Program-Phase III
(TEQIP-III)

(Dr. A.P.J. Abdul Kalam Technical University, Uttar Pradesh, Lucknow)

One Week Faculty Development Program

02nd - 06th July, 2018

Certificate of Participation

This is to certify that DR. B. N. PATHAK

IMS ENGINEERING COLLEGE , GHAZIABAD

has successfully completed one week Faculty Development Program on

"Reconfigurable manufacturing system: Research Potential"

conducted by the Department of Mechanical Engineering, ABES Engineering College, Ghaziabad (U.P.) under TEQIP-III Dr. A.P.J. Abdul Kalam Technical University, Uttar Pradesh, Lucknow.

Dr. Kishore Guru / Gaganpreet Kaur
Coordinator, FDP

Prof. (Dr.) R.K. Shukla
Head (ME)

Prof. Gajendra Singh
Director

5

Roll No: NPTEL19ME20S51330200

To
IMS ENGINEERING COLLEGE
GHAZIABAD

28/449

Score	Type of Certificate
>=90	Elite+Gold
75-89	Elite+Silver
>=60	Elite
40-59	Successfully completed the course
<40	No Certificate

No. of credits recommended by NPTEL:3

Elite

NPTEL Online Certification

(Funded by the Ministry of HRD, Govt. of India)

This certificate is awarded to

BIBEKA NAND PATHAK

for successfully completing the course

Manufacturing Process Technology

with a consolidated score of **78** %

Online Assignments	21.47/25	Proctored Exam	57/75

Total number of candidates certified in this course: **1475**

T V Prabhakar

Prof. T. V. Prabhakar
Chairman
Centre for Continuing Education, IITK

Jan-Apr 2019
(12 week course)

Satyakiroy

Prof. Satyaki Roy
NPTEL Coordinator
IIT Kanpur

Indian Institute of Technology Kanpur

FREE ONLINE EDUCATION swayam

Roll No: NPTEL19ME20S51330200

To validate and check scores: http://nptel.ac.in/noc

Roll No: NPTEL19MG24S51330066

To
AJAY SINGH PARMAR
B 169 FIRST FLOOR MAHENDRA ENCLAVE
SHASTRI NAGAR
GHAZIABAD
UTTAR PRADESH
201001
PH. NO :9899640307

Score	Type of Certificate
>=90	Elite+Gold
75-89	Elite+Silver
>=60	Elite
40-59	Successfully completed the course
<40	No Certificate

No. of credits recommended by NPTEL:3

Elite

NPTEL Online Certification

(Funded by the Ministry of HRD, Govt. of India)

This certificate is awarded to

AJAY SINGH PARMAR

for successfully completing the course

Advanced Green Manufacturing Systems

with a consolidated score of 61 %

Online Assignments	23.75/25	Proctored Exam	37.5/75

Total number of candidates certified in this course: 78

T V Prabhakar

Prof. T. V. Prabhakar
Chairman
Centre for Continuing Education, IITK

Jan-Apr 2019
(12 week course)

Satyaki Roy

Prof. Satyaki Roy
NPTEL Coordinator
IIT Kanpur

Indian Institute of Technology Kanpur

FREE ONLINE EDUCATION swayam

ABES Engineering College

Estd. 2000

Department of Mechanical Engineering

Technical Education Quality Improvement Program-Phase III
(TEQIP-III)

(Dr. A.P.J. Abdul Kalam Technical University, Uttar Pradesh, Lucknow)

One Week Faculty Development Program

02nd - 06th July, 2018

Certificate of Participation

This is to certify that MR. DEEPAK KUMAR YADAV
IMS ENGINEERING COLLEGE, GHAZIABAD
has successfully completed one week Faculty Development Program on
"Reconfigurable manufacturing system: Research Potential"
conducted by the Department of Mechanical Engineering, ABES Engineering College, Ghaziabad (U.P.)
under TEQIP-III Dr. A.P.J. Abdul Kalam Technical University, Uttar Pradesh, Lucknow.

Dr. Kishore Guru / Gaganpreet Kaur
Coordinator, FDP

Prof. (Dr.) R.K. Shukla
Head (ME)

Prof. Gajendra Singh
Director

Approved by AICTE, New Delhi & Affiliated to Dr APJ Abdul Kalam Technical University, Uttar Pradesh, Lucknow, NAAC Accredited, NBA Accredited Branches (CSE, ECE, ME, EN & IT) & ISO 9001:2008 Certified College

steag

STEAG Energy Services (India) Pvt. Ltd. | A- 29, Sector – 16, Noida – 201 301 | India

Praveen Kr. Ambastha
Addl. General Manager- PADO
System Technologies
Phone +91 120 4625 345
Fax +91 120 4625 100
Mobile +91 9810252690

p.ambastha@steag.in

July 10, 2018

TO WHOMSOEVER IT MAY CONCERN

This is to certify that Ms. Mubina Shekh, Assistant. Professor IMS Engineering College, Ghaziabad (U.P) -201009 visited our Noida Office from 05/07/2018 to 10/07/2018 (5 Days).

During her visit she has seen

- Power Plant Optimization software PADO (Performance Analysis & Diagnostic Optimization) for NTPC & Non NTPC Power Plant. which is used to enhance efficiency of Power Plant.
- Overview of Ebsilon software & its use to Design a Power Plant.
- Overview of latest configuration of 800 MW Super Critical Plant.
- Steag 430 MW CCGT Simulator which is used to give training to Power Plant Engineer.

Yours sincerely Praveen Ambastha

Praveen Kr. Ambastha

NCML INDUSTRIES LIMITED
An ISO 22000:2005 HACCP Certified Co. CIN : U65926DL1996PLC082284
Works : Khasra No. 512-514, Village Chhajarsi, Pilakhuwa, Distt. Hapur (U.P.) 245304
Phone : 0120-4921201 to 220, Website: www.ncml.co.in, E-mail: info@ncml.co.in

TO WHOME SOEVER IT MAY CONCERN

Ref: HR/TRG/018-7 **Date: 15/07/2017**

This is to certify that **Mr. Ankit Kumar saxena** Mechanical Engineering Branch, has taken training in our manufacturing unit in different department. From 10/07/2018 to 14/07/2018.

1. Chemical refinery (Refining of Crude vegetable in to refined vegetable oil by using food grade chemicals) & physical refinery
2. Reverse Osmosis plant and demineralization plant for water purification.
3. Steam boilers having capacity of 10 TPH and 6 TPH for saturated steam generation.
4. Thermic fluid heater to heat vegetable oil above 180 Deg ^{0} C Temperature.
5. Effluent Treatment Plant – to treat waste water form refinery.
6. Utilities Department
7. Quality control and Assurance department

We wish him all success in his future endeavor's

Thanking you

For, NCML Industries Ltd.

Vice president Operations

(Vinod Kumar)

Letter No. 1078 Date:- 14-07-18

GOVERNMENT OF BIHAR

WATER RESOURCE DEPARTMENT

TO WHOM IT MAY CONCERN

This is to certify that **Mr. RAVI RANJAN .** has taken training in Gandak barrage workshop ,valmikinagar from 10/07/2018 to 14/07/2018 .He has successfully supervised the works.

He is hard working and bears a Good character. I whishes will all success in his future endeavor's.

14-07-18
EXECUTIVE ENGINEER

कार्यपालक अभियंता (यौ०)
सिंचाई यांत्रिक प्रमण्डल
वाल्मीकिनगर

Date: 14-07-2018

steag

STEAG Energy Services (India) Pvt. Ltd. | A- 29, Sector – 16, Noida – 201 301 | India

Praveen Kr. Ambastha
Addl. General Manager- PADO
System Technologies
Phone +91 120 4625 345
Fax +91 120 4625 100
Mobile +91 9810252690

p.ambastha@steag.in

July 10, 2018

TO WHOMSOEVER IT MAY CONCERN

This is to certify that Mr. O.P. Umrao, Associate Professor IMS Engineering College, Ghaziabad (U.P) -201009 visited our Noida Office from 05/07/2018 to 10/07/2018 (5 Days).

During his visit he has seen

- Power Plant Optimization software PADO (Performance Analysis & Diagnostic Optimization) for NTPC & Non NTPC Power Plant. which is used to enhance efficiency of Power Plant.
- Overview of Ebsilon software & its use to Design a Power Plant.
- Overview of latest configuration of 800 MW Super Critical Plant.
- Steag 430 MW CCGT Simulator which is used to give training to Power Plant Engineer.

Yours sincerely Praveen Ambastha

Praveen Kr. Ambastha

विजयपुर : 473111
जिला : गुना (म.प्र.)

Fax / फैक्स : (91) 07544 - 273109, 273089
Website / वेबसाईट : www.nationalfertilizers.com

नेशनल फर्टिलाईज़र्स लिमिटेड
एन.एफ.एल.
NATIONAL FERTILIZERS LIMITED

नेशनल फर्टिलाईज़र्स लिमिटेड
(भारत सरकार का उपक्रम)

National Fertilizers Limited
(A GOVERNMENT OF INDIA UNDERTAKING)
Vijaipur - 473 111 Distt. Guna (M.P.) India
An ISO - 9001 & ISO - 14001 Unit

CERTIFICATE

Certified that ***MR. ABHISHEK SAXENA*** *a* ***Assistant Professor (Mechanical Engineering Deptt.),*** *I.M.S. Engineering College, Ghaziabad (U.P.) undergone Practical / Vocational / Industrial training in this organization from* ***04.07.2018*** *to* ***08.07.2018.*** *Certified for academic purpose only. No obligations / Liabilities on the part of NFL.*

His Performance during the training was Very Good & Conduct was certified.

The subject of special study project was "General/Vocational/ Industrial Training" on Special Machine tool (Horizontal Boring Maching, lathe Machine, Radial Drill machine, Hydraulic Machine etc. in ***MECHANICAL*** *Department &* ***NDT Lab.***

(K.V. Rao)
Chief Manager(HRD)

K.V. Rao
Chief Manager (HRD)
एनएफएल, विजयपुर (म.प्र.)

Date of Issue: 09.07.2018

Indian Institute of Technology Bhubaneswar

Government of India
Ministry of Human Resource Development

सत्यमेव जयते

GIAN
GLOBAL INITIATIVE OF ACADEMIC NETWORKS

GLOBAL INITIATIVE FOR ACADEMIC NETWORKS

Certificate of Participation

This is to certify that ~~Prof./Dr.~~/Mr./~~Ms.~~ Shubham Sharma

from IMS Engineering College, Ghaziabad *participated in the course*

CHALLENGES FOR WELDING AND FABRICATION OF CSEF STEEL STRUCTURES FOR LOW POLLUTION ULTRA-SUPERCRITICAL POWER PLANT APPLICATIONS

from

9-13, July 2018

at

School of Mechanical Sciences, IIT Bhubaneswar

Dean (CE)
IIT Bhubaneswar

M·M·Mahapatra

V. Pandey

Course Coordinator

ABES Engineering College

Estd. 2000

Department of Mechanical Engineering

Technical Education Quality Improvement Program-Phase III
(TEQIP-III)

(Dr. A.P.J. Abdul Kalam Technical University, Uttar Pradesh, Lucknow)

One Week Faculty Development Program

02nd - 06th July, 2018

Certificate of Participation

This is to certify that MR. VIVEK KUMAR JAIN

IMS ENGINEERING COLLEGE, GHAZIABAD

has successfully completed one week Faculty Development Program on

"Reconfigurable manufacturing system: Research Potential"

conducted by the Department of Mechanical Engineering, ABES Engineering College, Ghaziabad (U.P.)
under TEQIP-III Dr. A.P.J. Abdul Kalam Technical University, Uttar Pradesh, Lucknow.

Dr. Kishore Guru / Gaganpreet Kaur
Coordinator, FDP

Prof. (Dr.) R.K. Shukla
Head (ME)

Prof. Gajendra Singh
Director

Roll No: NPTEL19ME17S51330062

To
IMS ENGINEERING COLLEGE
GHAZIABAD

28/449

Score	Type of Certificate
>=90	Elite+Gold
75-89	Elite+Silver
>=60	Elite
40-59	Successfully completed the course
<40	No Certificate

No. of credits recommended by NPTEL:2

Elite

NPTEL Online Certification

(Funded by the Ministry of HRD, Govt. of India)

TOP TOPPER 1%

This certificate is awarded to

VIVEK KUMAR JAIN

for successfully completing the course

Joining Technologies for Metals

with a consolidated score of **95** %

Online Assignments	24.17/25	Proctored Exam	70.5/75

Total number of candidates certified in this course: **268**

Prof. B. K. Gandhi
Coordinator, Continuing Education Centre
NPTEL Coordinator, IIT Roorkee

Feb-Apr 2019
(8 week course)

Indian Institute of Technology Roorkee

FREE ONLINE EDUCATION swayam

NCML INDUSTRIES LIMITED
An ISO 22000:2005 HACCP Certified Co. CIN : U65923DL1996PLC082284
Works : Khasra No. 512-514, Village Chhajarsi, Pilakhuwa, Distt. Hapur (U.P.) 245304
Phone : 0120-4921201 to 220, Website: www.ncml.co.in, E-mail: info@ncml.co.in

TO WHOME SOEVER IT MAY CONCERN

Ref: HR/TRG/018-5 **Date: 15/07/2017**

This is to certify that **Mr. Sunil Kumar** Mechanical Engineering Branch, has taken training in our manufacturing unit in different department. From 10/07/2018 to 14/07/2018.

1. Chemical refinery (Refining of Crude vegetable in to refined vegetable oil by using food grade chemicals) & physical refinery
2. Reverse Osmosis plant and demineralization plant for water purification.
3. Steam boilers having capacity of 10 TPH and 6 TPH for saturated steam generation.
4. Thermic fluid heater to heat vegetable oil above 180 Deg ^{0} C Temperature.
5. Effluent Treatment Plant – to treat waste water form refinery.
6. Utilities Department
7. Quality control and Assurance department

We wish him all success in his future endeavor's

Thanking you

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Vice president Operations

(Vinod Kumar)

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To whomsoever it may concern

This is certified that Mr. Shiv Om Sharma has under gone a training of 5 days between 02/07/2018 to 06/07/2018 on production line and inventory management. During this period his behavior and conduct was good.

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THIS IS TO CERTIFY THAT SH MANORANJAN CHAUBEY S/O SH JITENDRA CHAUBEY HAS WORKDED ON HVAC DESIGN AND DRAFTING FROM 09.07.2018 TO 14.07.2018 AT OUR OFFICE AT DWARKA, NEW DELHI. DURING THIS PERIOD HIS PERFORMANCE WAS FOUND SATISFACTORY. WE WISH HIM ALL SUCCESS IN LIFE.

FOR S M ASSOCIATES

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Subnet Based Ad Hoc Network Algorithm Reducing Energy Consumption in MANET

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Abstract
One of the most critical issues in wireless ad hoc networks is represented by the limited availability of energy with in network nodes. The time period from the instant when the network starts functioning to the instant when the first networknode runs out of energy, the so-called network life-time, strictly depends on the system energy efficiency. In This paper is concern to devlope and evaluate route discovery between source node to destination in the mobile ad hoc network and Our objective of this paper modify existing protocol is to devise techniques to maximize the network life-time in the case of Subnet based systems, which represent a significant sub-set of ad hoc networks. We propose an original approach to maximize the network life-time by determining the optimal subnet size and the optimal assignment of nodes to subnet-heads[16].

Keywords: AODV, ANDA, ACC, MANET, Path selection, RREQ, Energy consumption

INTRODUCTION

A mobile ad hoc network is the collection of autonomous mobile nodes and terminal that communicate each other in decentralized manner. Therefor greatest challenge manifesting in the design of wireless ad hoc networks is the limited availability of energy resources these resources are quite significantly limitted in wireliess networks than in wired network. Each of these mobile nodes is operated by limitted energy battery and usually it is impossible to recharge or replace the batteries during a mission. [13] Most mobile nodes in a wireless ad hoc network are powered by energy limitted so battery life time is a hindrance to network performance. There for energy efficiency is of vital importance in the desgin of protocol for the application for the application in such networks and hence the study and implimentation of energy efficient algorithm for ad hoc network . the mobile ad hoc routing protocol can be classified into main three categoeries Proactive (Table Driven) Reactive (On Demand driven) and hybrid. In proactive routing protocol each nodes maintain the information about the other node in the form of table the various routing protocol like that DSDV, WRP, OLSR, FSR, CGSR etc. [3]

In Reactive routing protocol establish routs only they are needed. When source node requiers a route to destination it flooding route request packet (RREQ) in entire network once route has been established by recieving a route reply

(RREP). In hybrid routing protocols attempts to combine the best feature proactive and reactive algorithm while our proposed algorithm used in mobile ad hoc network then reduse the energy cossumption.[6]

In subnet based network, mobile nodes are devided into several groups. In each group, one node is elected to be the subnet-head, and act as Regional admin and other nodes act as simple node. The subnet size is controlled by varying the subnet -head's transmission power. The subnet-head coordinates transmissions within the subnet and handles inter subnet traffic and delivers all packets to the subnet.

In this paper, we consider a network and first of we choose the subnet-heads and the network topology is like sensor network, either static or slowly changing. We propose a Algorithm Adhoc Network Design Algorithm, which maximizes the network life-time while providing the total coverage of the nodes in the network. Ad hoc Network Design Algorithm is based on the concept that subnet-heads can dynamically adjust the size of the subnet through power control, and, hence, the number of controlled nodes per subnet. Ad hoc Network Design Algorithm takes into account power consumption due to both the transmission and receiving of data packets, and it maintains the energy consumption over the whole network. Energy is evenly drained from the subnet heads by optimally balancing the subnet traffic loads and regulating the subnet heads transmission ranges.

THE NETWORK LIFE-TIME

We consider a generic ad hoc network architecture based on a subnetting approach. The network topology is assumed to be either static, like in sensor networks, or slowly changing. Let $S_S = \{1,...,S\}$ be the set of subnet-heads and $S_N = \{1,...,N\}$ be the set of ordinary nodes to be assigned to the subnet. Subnet-heads are chosen a priori and are fixed throughout the network life-time, while the coverage area of the Subnets is determined by the level of transmission power used by the Subnet-heads. Three are the major contributions to power consumption in

radio devices: i) power consumed by the digital part of the circuitry; ii) power consumption of the transceiver in transmitting and receiving mode;

iii) output transmission power. Clearly, the output transmission power depends on the devices' transmission range and the total power consumption depends on the number of transmitted and received packets. Under the assumption that the traffic load is uniformly distributed among the network nodes, the time interval that spans from the time instant when the network begins to function until the generic Subnet-head i runs out of energy, can be written as

$$l_i = E_i / (\alpha r_i^2 + \beta |n_i|) \quad (1)$$

where E_i is the initial amount of energy available at Subnet-head i, r_i is the coverage radius of Subnet-head i, n_i is the number of nodes under the control of Subnet-head i, and α and β are constant weighting factors. In (1), the two terms at the denominator represent the dependency of power consumption on the transmission range and on the Subnet-head transmitting/receiving activity, respectively. Notice that, for the sake of simplicity, the relation between the Subnet-head power consumption and the number of controlled nodes is assumed to be linear; however, any other type of relation could have been considered as well, with minor complexity increase. Considering that the limiting factor to the network life-time is represented by the Subnet-heads' functioning time, the lifetime can be defined as

$$L_S = \min_{i \in Ss} \{L_i\} \quad (2)$$

Our objective is to maximize L_S while guaranteeing the coverage of all nodes in the network.

ENERGY-EFFICIENT NETWORK DESIGN

In this section, we formally describe the problem of maximizing the network life-time. Two different working scenarios are analyzed: static and dynamic. In the former, the assignment of the nodes to the Subnet-heads is made only once and maintained along the all duration of the system. In the latter, the network configuration can be periodically updated in order to provide a longer network life-time. Then, we propose an energy-efficient design algorithm, so-called ANDA (Ad hoc Network Design Algorithm), which maximizes the network life-time by fixing the optimal radius of each Subnet and the optimal assignment of the nodes to the Subnets. ANDA is optimum in the case of the static scenario and can be extended to the dynamic scenario by using a heuristic rule to determine whether at a given checking time the network needs to be reconfigured.[19]

PROBLEM FORMALIZATION

We assume that the following system parameters are known: number of Subnetheads (S), number of nodes in the network (N), location of all Subnet-heads and nodes, and initial value of the energy available at each Subnet-head. Let d_{ik} be the Euclidean distance between Subnet-head i and node k (i = 1,...,S; k = 1,...,N); we have that $r_i = d_{ij}$ when j is the farthest node controlled by Subnet-head i. Next, let us introduce matrix $L=\{l_{ij}\}$, whose dimension is equal to

$|S_S| \times |S_N|$ and where each entry l_{ij} represents the life-time of Subnet head i when its radius is set to $r_i = d_{ij}$ and it covers

$n_{ij} = \{ k \in S_N \mid dik \leq dij \}$ nodes. We have

$$l_{ij} = E_i / \alpha d^2_{ij} + \beta |n_{ij}| \quad (3)$$

Once matrix L is computed, the optimal assignment of nodes to Subnetheads is described by the binary variable x_{ij} . x_{ij} is equal to 1 if Subnet-head i covers node j and equal to 0 otherwise. We derive the value of x_{ij} (i = 1,...,S; j = 1,...,N) by solving the following max/min problem

$$\begin{aligned} &\text{Maximize} && L_S && (4)\\ &\text{subject to} && \textstyle\sum_i x_{ij} \geq 1 && \forall j \in S_N \\ & && L_S \leq l_{ij} x_{ij} + M(1 - x_{ij}) && \forall i \in S_S , j \in S_N \\ & && x_{ij} \in \{0, 1\}, LS \geq 0 && \forall i \in S_S , j \in S_N . \end{aligned}$$

The first constraint in the problem requires that each node is covered by one Subnet-head at least; the second constraint says that if node j is assigned to Subnet-head i, the system can not hope to live more than l_{ij} . When node j is not assigned to Subnet-head i, this constraint is relaxed by taking a sufficiently large M.

This model can be easily extended to the dynamic scenario by dividing the time scale into time steps corresponding to the time instants at which the network configuration is recomputed. Time steps are assumed to have unit duration. Then, we replace x_{ij} with x^s_{ij} , where x^s_{ij} is equal to 1 if and only if Subnet-head i covers node j at time step s and 0 otherwise, and E_i, d_{ij} , n_{ij} , lij with E^s_i , d^s_{ij} , n^s_{ij} , l^s_{ij} , i.e., with the corresponding values computed at time step s. Note, however, that in this case the model is no longer linear, since the model parameters depend on the time step and, thus, on the former nodes assignment.

THE PROPOSED ALGORITHM

Ad hoc Network Design Algorithm for Sub netting

The protocol must be adaptive to the dynamic topology of the network. The previous algorithms deal with static sensor nodes whereas in a mobile ad hoc network the static

assumption of nodes is not possible. So designing an energy efficient sub netting algorithm for mobile nodes is a challenging issue.

The mobile ad hoc network can be modelled as a set of nodes S_N = {1 … N} and a set of subnet-heads S_s = {1 … S} where N is total number of nodes and S is the total number of subnet-heads. The set of nodes S_N remains static throughout the network lifetime but the cardinality of set of subnet-heads i.e. $|S_s|$ changes due to the energy considerations and mobility of the nodes. Each node $n_i \epsilon N$ has a unique integer identifier n_i, a wireless transmission range r_i and initial energy E_i.

The ordinary node is the node that S_N and ¢S_s .Every ordinary node ϵ S_N inside the range of the subnet-head ϵ S_s is eligible to be assigned to S_s. The communication is assumed to be single hop in nature.[10]

Basis of the Approach

The proposed sub netting algorithm and the protocols have the following features:

- A node can be assigned to a subnet-head if the node comes within the range of the subnet-head.
- Subnet -heads are selected from among the nodes randomly which is very practical in case of wireless ad hoc networks instead of having a fixed set of subnet heads.
- Set of subnet heads are selected dynamically after a periodic interval in a round schedule balancing the load (energy dissipation) throughout the nodes of the network.
- Every node communicates to other node through a subnet -head and is not directly connected to any other ordinary node (Single hop architecture).

Subnet-head Selection

The first thing to do select the set of subnet -heads S_H .Initially, when subnets are being created, each node decides whether or not to become a subnet -head for the current round according to the table created periodically and updated every N/S rounds. This decision is based on the suggested percentage of subnet heads for the network (determined a priori) and the number of times the node has been a subnet -head so far. After a broadcast of HELLO messages the total network data is clubbed together and the nodes are sorted according to their current residual energy.

THE PROBLEM FORMALIZATION

- Let S_H= {1,……,H} be the set of subnet-heads,
- S_N= {1,…….,N} be the set of ordinary nodes to be assigned to the subnets
- Let d_{ik} =distance between subnet-head i and node k(i=1,……H ; k=1……..,N)
- $r_i=d_{ij}$ when j is the farthest node controlled by subnet-head i
- Matrix L={l_{ij}},dimension=$|S_H|$ x $|S_N|$ where each entry l_{ij} represents the lifetime of subnet-head i when its radius is set to $r_i=d_{ij}$ and it covers n_{ij} ={k ϵ S_N|$d_{ik} \leq d_{ij}$}

Once matrix L is computed, the optimal assignment of nodes to subnet heads is described by the binary variable X_{ij}

{X_{ij} =1 if subnet-head i covers j else 0}

Algorithm ***Selectsubnet***

If (N/S divides Δ)

Begin **nodeSort**

for (every iϵS_S)

for (every jϵS_N)

if(energy[i] > energy[j])

swap(i ,j)

end for

end for

end**nodeSort**

end if

This is followed by the creation of the *subnet table* at each node which contains the set of subnet heads for 1/P rounds, where P is the percentage of nodes becoming subnet -heads. Thus each node has the idea which node is subnet head for this current round. The subnet table contains S subnet heads each in N/S columns in the sorted order of the energy, where N is the total number of nodes in the network. There after the S subnet heads for the current round are stored in S_S, the set of subnet-heads and the rest nodes are stored in S_N , set of ordinary nodes. This is followed by node assignment.

Node Assignment

S_S = {1…S}, set of subnet-heads and S_N= {1…N} be the set of ordinary nodes to be assigned to the subnet. Major Contributions to power consumption in nodes are: power consumed by the digital part of the circuitry, Power consumption of the transceiver in transmitting and receiving mode and output transmission power**.** The lifetime is calculated according to the following equation:-

$$li = \frac{Ei}{\alpha r\ i2+\beta|ni|}$$

Where E_i is the initial amount of energy available at subnet-

head i, r_i is the coverage radius of subnet -head i, n_i is the number of nodes under the control of subnet -head i, and α and β are constants. Considering that the limiting factor to the network lifetime is represented by the subnet -head's functioning time, the lifetime is defined by

$$L_s = min_{i \epsilon\ Ss}\{L_i\}$$

The main objective is to maximize L_s. The Algorithm for assignment of the nodes is as follows

Begin Assignnodes

for (every iϵS_S)

set E_i=initial energy of subnet-head i

for (every jϵS_N)

Compute d_{ij},$|n_{ij}|$,l_{ij}

end for

end for

$L_s^{(new)} = L_s^{(old)} = L_s$

$\Delta=0$

while($L_s^{(new)} \leq L_s^{(old)} - \Delta$)

$\Delta=\Delta+1$

for (every iϵS_S)

for (every jϵS_N)

Recompute$E_i = E_i - \Delta(\alpha r_i^2 + \beta|n_{ij}|)$

Update l_{ij} ¥ iϵS_S, jϵS_N

end for

end for

Call ***Selectsubnet*** and update Ls

$Ls^{(new)}$=Ls

end while

end***Assignnodes***

Performance Evaluation

Simulation tools Network simulator will be used as the simulation tool for the implimentation of my algorithm NS2 is choosen as as the simulator partly because of the range of feature it provide a open source code that can be modified and extend . Network simulator (NS) is an object oriented descrete event simulator for networking research. NS provide substantial support for simulation of TCP, Routing and multicasting protocol over wired and wireless networks.

PERFORMANCE MATRICS-

Network life time- When network start functioning to the instant when the first network node runs out of energy, so called network life time strictly depends on the system energy efficiency. If device technique to maximize the network lifetime in the case of subnet based system .

Packet Delivery ratio (PDR)- (PDR)is defined as the ratio between the total number of data packet received by the corresponding destination host in the internet and total number of data packet sent to the internet by the mobile nodes in the MANET.

Average End to End Delay- It is defined as the average time needed to send a data packet from a node to a host in the internet . It is computet in millisecond (ms).

Throughput- It is defined as the average rate of success full message delivered over communication channel.

Routing overhead- It defined as the total number of control packet generated at every mobile node.

NUMERICAL RESULTS

The performance of Ad hoc network design Algorithm (ANDA) is derived in terms of network life-time and variance of the residual energy at the subnet-heads measured at the time instant at which the first subnet-head runs out of energy. Results are plotted as functions of the ratio of the output transmission power to the power consumption due to the transmitting/receiving activity, denoted by *K*. We consider that all the nodes in the network are fixed and have initial energy $Ei = 1$ with $i = 1, ...,N$. We assume that the subnet-heads are uniformly distributed over the network area and are known a priori. Results were derived also in the case of a slowly changing network topology however, they do not significantly differ from those obtained in the case of a network with fixed nodes.

First, we consider the static scenario, where only one network configuration is allowed. We compare the performance of Ad hoc network design Algorithm with the results obtained by using a simple network design algorithm based on the minimum distance criterion (in the plots denoted by label *ACC (Assignment to Closest Subnethead)*), which simply assigns each node to the nearest subnet-head.

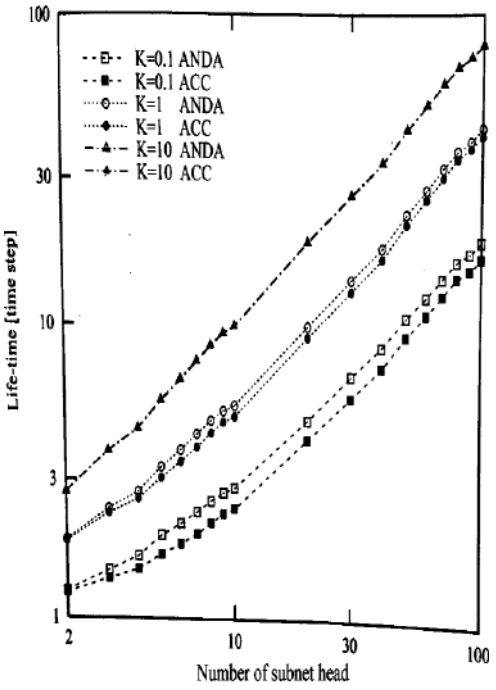

Figure 1: Static scenario: Life-time as a function of the number of subnet-heads, for a number of nodes equal to 1000 and different values of *K*. Results obtained through Ad hoc network design Algorithm (ANDA) and the ACC scheme are compared.

Fig. 1 shows the network life-time as a function of the number of subnet-heads,S. Curves are obtained for $N = 1000$, varying values of *K*, and nodes uniformly distributed over the network area. As expected, the life-time increases with the increase of the number of subnet-heads. From the comparison with the performance of the ACC scheme, we observe that the improvement achieved through Ad hoc network design Algorithm is equal to 15% for $K = 0.1$, while it becomes negligible for $K = 10$, i.e., when the output transmission power contribution dominates. For both the ACC scheme and Ad hoc network design Algorithm, a longer life-time is obtained when the major contribution to power consumption is due to the output transmission power ($K = 10$). In fact, both the schemes are able to level the output transmission power consumption among the subnet-heads; while, it is difficult to achieve an even distribution of the nodes among the subnets.

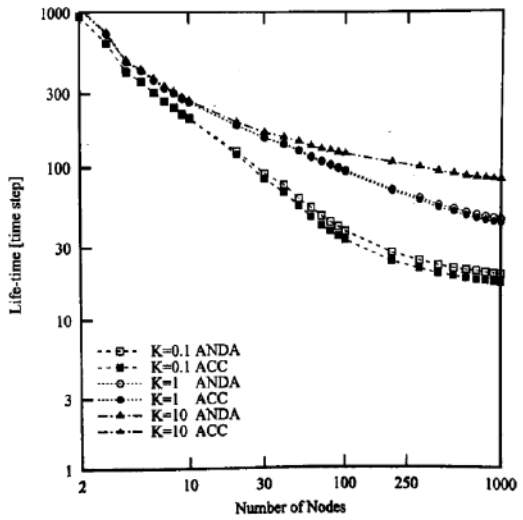

Figure 2: Static scenario: Life-time as a function of the number of nodes, for a number of subnet-heads equal to 100 and different values of *K*. Results obtained through Ad hoc network design Algorithm and the ACC scheme are compared

Fig. 2 shows the network life-time as the number of nodes changes, for a number of subnet-heads $C = 100$ and a uniform distribution of the network nodes. The life-time decreases as the number of nodes grows; however, for a number of nodes greater than 100, the life-time remains almost constant as the number of nodes increases.

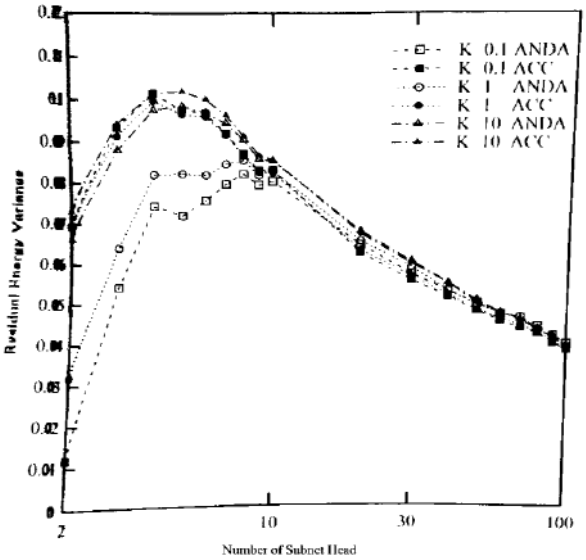

Figure 3: Static scenario: Variance of the residual energy at the subnet-heads as a function of the number of subnet-heads. Curves are plotted for a number of nodes equal to 1000 and for varying values of *K*. Results obtained through ANDA and the ACC scheme are compared.

Fig. 3 shows the variance of the residual energy at the subnet-heads as a function of the number of subnet-heads. The number of nodes in the network is set equal to 1000. For small

values of *S*, we have a low variance since all subnetheads have to control a large number of nodes. Increasing *S*, some subnet-heads may have to cover few nodes while others may experience a significant energy consumption, thus resulting in higher values of variance. For values of *S* greater than 25, the variance drops below 0.07 suggesting that all subnet-heads are evenly drained. Also, we notice that for small values of *S* and $K < 1$ we have lower variance than for $K \geq 1$ since, as mentioned above, it is hard to achieve an equal distribution of the nodes among the subnets. For any value of *K* Ad hoc network design Algorithm outperforms the ACC scheme. Next, we consider the dynamic scenario with $S = 100$ and $N = 1000$. In this case, periodical updates of the network configuration are executed; the more frequently the network configuration is updated, the greater the network lifetime and the system complexity. Thus, results showing the trade-off between network life-time and number of executed configuration updates are presented.

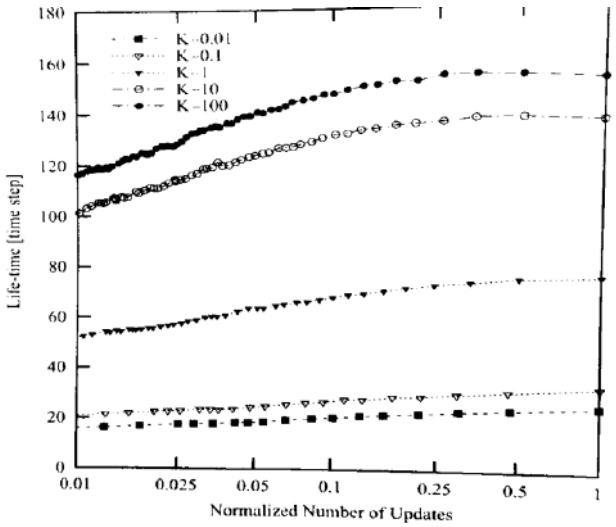

Figure 4: Dynamic scenario: Life-time versus the normalized number of configuration updates, for a number of nodes equal to 1000, for a number of Subnet-heads equal to 100 and different values of *K*. Nodes are uniformly distributed in the network area.

Fig. 4 presents the network life-time for different values of *K* and nodes uniformly distributed in the network area. In abscissa, it is reported the number of performed configuration updates normalized to the observation time expressed in time steps. The life-time significantly increases as the number of reconfigurations grows since the energy available in the system is better exploited. For all values of *K* and a normalized number of updates equal to 1, an improvement of about 50% with respect to the case where ANDA is applied to the static scenario is obtained.

Finally, we expect that by combining the proposed assignment scheme with subnet-heads rotation the network life-time will further increase. However, subnet-heads rotation involves an election procedure during which all nodes must be synchronized, thus resulting in an increased system complexity as well.

CONCLUSIONS

We addressed the problem of maximizing the life-time of a wireless ad hoc network, i.e., the time period during which the network is fully working. We focused on subnet-based networks and presented an original solution that maximizes the network life-time by determining the optimal subnet size and assignment of nodes to subnet-heads. We considered two working scenarios: in the former, the network configuration is computed only once; in the latter, the network configuration can be periodically updated. We obtained improvements in the network life-time equal to 15% in the case of the static scenario, and up to 74% in the in the case of dynamic scenario.

REFERENCES

[1] R. MISRA AND C.R. MANDAL, "PERFORMANCE COMPARISON OF AODV/DSR ON-DEMAND ROUTING PROTOCOLS FOR AD HOC NETWORKS IN CONSTRAINED SITUATION" *ICPWC INTERNATIONAL CONFERENCE, IEEE*, 2005, PP. 86 – 89

[2] Vahid Nazari Talooki and Koorush Ziarati, "Performance Comparison of Routing Protocols For Mobile Ad Hoc Networks" *Asia-Pacific Conference on Communications, APCC*, 2006, pp. 1 – 5

[3] Bertocchi, P. Bergamo, G. Mazzini and M. Zorzi, "*Performance Comparison of routing protocols for Ad hoc networks," IEEE Global Telecommunications Conference, GLOBECOM*, 2003, pp. 1033 – 1037

[4] Amr M. Hassan, Mohamed I. Youssef and Mohamed M. Zahra, "Evaluation of Ad Hoc Routing Protocols in Real Simulation Environments" *The 2006 International Conference on Computer Engineering and Systems*, 2006, pp. 288 – 293

[5] D. Kiwior and L. Lam, "Routing Protocol Performance over Intermittent Links" *Military Communications Conference, MILCOM, IEEE*, 2007, pp. 1 – 8

[6] S. Demers and L. Kant, "MANETs: Performance Analysis and Management", *Military Communications Conference, MILCOM*, 2006, pp.1 – 7

[7] A. Zahary, A. Ayesh, "Analytical study to detect threshold number of efficient routes in multipath AODV extensions", *proceedings of International Conference of Computer Engineering & Systems, ICCES*, 2007, pp. 95 – 100

[8] Lijuan Cao, K. Sharif, Yu Wang, T. Dahlberg, "Adaptive Multiple Metrics Routing Protocols for Heterogeneous Multi-Hop Wireless Networks", *proceedings for 5th CCNC Consumer Communications and Networking Conference, IEEE*, 2008, pp. 13 – 17

[9] Jin Mook Kim, In Sung Han, Jin Baek Kwon, Hwang Bin Ryou, "A Novel Approach to Search a Node in MANET", *Information Science and Security, ICISS*, 2008, pp. 44 – 48

[10] S. R. Chaudhry, A. Al-Khwildi, Y. Casey, H. Aldelou, "A Performance Comparison of Multi On- Demand Routing in Wireless Ad Hoc Networks", *Wireless Network and Communications Group (WNCG), School of Engineering & Design, Brunel University, West London*

[11] Mohammad Naserian, Kemal E. Tepe and Mohammed Tarique, "Routing overhead analysis for reactive routing protocols in wireless ad hoc networks," *IEEE Conference on Wireless And Mobile Computing, Networking And Communications, WiMob*, 2005, pp. 87 – 92

[12] Uyen Trang Nguyen and Xing Xiong, "Rate-adaptive Multicast in Mobile Ad hoc Networks," *IEEE International Conference on Ad hoc and Mobile Computing, Networking and Communications, WiMob*, Montreal, Canada, 2005

[13] Rainer Baumann, Simon Heimlicher and Martin May, "Towards Realistic Mobility Models for Vehicular Ad hoc Networks," *2007 Mobile Networking for Vehicular Environments*, 2007, pp. 73 - 78 http://www.opnet.com/solutions/system_requirements /modeler/index.html, date last updated: 2008-12-31

[14] Chang, J.H., Tassiulas, L., "Energy conserving routing in wireless ad hoc networks," Proc. INFOCOM 2000, Tel-Aviv, Israel, Mar. 2000.

[15] Rabiner Heinzelman, W., Chandrakasan, A., Balakrishnan, H., "Energy-Efficient Communication Protocols for Wireless Microsensor Networks," Proc. HICSS, Maui, Hawaii, Jan. 2000.

[16] Haker, D.J., Ephremides, A., "The Architectural Organization of a Mobile Radio Networkvia a Distributed Algorithm," IEEE Trans. on Comm., Vol. 29, No. 11, Nov. 1981, 1694–1701. 386 C.-F. Chiasserini et al.

[17] Gerla, M., Tsai, T.-C., "Multicluster, Mobile, Multimedia Radio Network," ACM/Baltzer Journal of Wireless Networks, Vol. 1 , No. 3, 1995, 255–265.

[18] Kwon, T., Gerla, M., "Clustering with Power Control," Proc. MILCOM'99,Nov. 1999.

[19] Lin, C.R., Gerla, M., "Adaptive Clustering for Mobile Wireless Networks," IEEE JSAC, Vol. 15, No. 7, Sep. 1997, pp. 1265–1275.

[20] McDonald, A.B., "A Mobility-Based Frameworkfor Adaptive Clustering in Wireless Ad-Hoc Networks," IEEE JSAC, Vol. 17, No. 8, Aug. 1999, 1466–1487.

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CONTENTS

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The Etiological Profile of Seizures in Children in a Tertiary Care Hospital, Hapur, Uttar Pradesh

Shweta Singh[1], M Agrawal[2], Yogesh Kumar Goel[3], Dayachand Verma[3]

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ABSTRACT

Objectives: 1) To study the incidence of seizures in children (1month – 18 years of age).

2) To elucidate the clinical and etiological profile of seizures

Setting: Children with seizures admitted in paediatric ward and paediatric intensive care unit of SIMS, Hapur.

Duration: Four years (January 2013- December 2017)

Design: Longitudinal observational study

Participants: All children admitted in paediatrics with convulsions were studied according to the performa designed with especial emphasis on detailed history, clinical examination and relevant investigations in stepwise manner.

Results: out of the 808 were cases of seizure (6.9% of the total admissions) there were 468 (58%) boys and 340 (42 %) girls. Maximum number (n= 523; 64.6%) were below 5 years. The most common presentation was GTCS (68%). The associated symptoms were fever (76%) followed by altered sensorium (58%). The most common cause was febrile seizure (48%), CNS infections (19.7%) and idiopathic cases (16.9%).

Conclusion: Childhood seizures are common neurological problem with maximum number of cases occurring at a younger age group. Improvement of basic health facilities, hygiene and immunization can bring down the various infective causes of seizures. Enabling the parents through the awareness programes can facilitate the overall success in the good results of outcome of the seizure episodes.

Keywords: *convulsions, seizure, febrile seizure, immunization*

INTRODUCTION

Seizures are one of the most common form of neurological illness among children admitted to the hospital [1]. A seizure or convulsion is a time limited change in motor activity and/or behavior that results from abnormal electrical activity in the brain [3]. An acute symptomatic seizure occur secondary to an acute problem like electrolyte disturbances, meningitis, encephalitis, acute stroke or brain tumor. An unprovoked seizure is one that is not an acute symptomatic seizure. Remote seizure is one that is considered secondary to a distant brain injury such as an old stroke, neonatal hypoxic brain injury. Reflex seizures are usually precipitated by a sensory stimulus such as flashing lights. Epilepsy is a disorder of the brain characterized by an enduring predisposition to generate seizures. For clinical purposes epilepsy is considered to be present when two or more unprovoked seizures occur in a time frame of more than 24 hours. The manifestations of the seizure depend upon

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the threshold of the brain to manifest a clinical seizure. The age and neurodevelopmental maturity status determine the clinical manifestations and the type of seizure encountered. The protean clinical manifestations and the complexity associated with the cause and management has led to the revised classification of seizures by the International League Against Epilepsy (ILAE)[20].

When the data from the developed nations are compared with developing nations, surprisingly similar results of incidence and prevalence is found in childhood seizures, with the cause being different even in different regions of the same nation[15,16,18] .

In most studies, the febrile seizures are the most common cause of seizure in children below 5 years of age. Electrolyte disturbances like hypocalcaemia was common between 1 month to 1 year of age[5] .

Causes like viral encephalitis, pyogenic meningitis, tubercular meningitis, epilepsy, head injury, late HDN, cerebral palsy, developmental anomaly of brain were other causes. Not to mention, neurocysticercosis shows predominance in certain regions of India[5,6,12].

The outlook for most children with symptomatic seizures or those associated with epilepsy is generally good but seizures may signal a potentially serious underlying systemic or central nervous system disorder that requires an aggressive resuscitation , stabilization and concurrent implementation of diagnostic testing, monitoring and pharmacological interventions.

Seizures perplex both the parents regarding the occurrence and prognosis and paediatricians regarding cause and management. Due to paucity of the epidemiological study on seizures, the present study was conducted to emphasize the evidence based knowledge, attitude and practice towards the seizure in children.

METHOD

This longitudinal observational study was conducted in the Department of Paediatrics, Saraswathi Institute of Medical Sciences, Hapur (U.P.) between 1st January , 2014 to 31st December, 2017. All children of age 1month to 18 years with acute seizures (history of seizures at home witnessed by relatives or seizures during hospitalization witnessed by staff) were included in the study. The study was approved by the Ethical Committee of the Institution. Patients were enrolled after written informed consent from parents and guardians.

Inclusion Criteria:

All children between 1 month to 18 years of age with seizures were included in the study.

Exclusion Criteria:

1. Neonates

2. Toxicological causes of convulsions

3. Children with seizure mimicking disorders like breath holding spells, migraine, apnea, syncope, panic attacks

Data Collection:

The history and clinical findings of subjects who were included in the study were recorded in the preformed Performa designed for the study. Relevant investigations were done to diagnose the cause of the seizure in step wise manner.

Complete blood count

C-reactive protein

Metabolic screening like serum electrolytes, serum calcium, serum glucose

Cerebrospinal fluid analysis

Imaging studies (CECT, MRI) of brain

Electroencephalograph

Chest x-ray, Montoux test

Statistical method:

As the present study was a descriptive study, the data was expressed as percentages and frequencies.

OBSERVATIONS AND RESULTS

Out of the 11680 children admitted during the study period, 808(6.9%) children fulfilled the criteria of cases with convulsions.

In our study the incidence as calculated by the percentage of seizure cases in total indoor pediatric patients was found to be 6.9%. In the age wise cohort, maximum number of cases were below 5 years(523) as

shown in Table 1.

Table 1: Incidence of convulsions in different age groups

Age group	No. of cases	Percentages
1month-1 year	177	21.9
1year – 3years	193	23.8
3 years – 5years	153	18.9
5years -7 years	75	9.2
7 years- 9 years	58	7.1
9 years- 11years	40	4.9
11years – 13 years	56	6.9
13years-15 years	24	2.9
15years-18 years	32	3.95

There were 468 boys and 340 girls in the study group accounting for 58% and 42% of the study population respectively.

GTCS was the most common type of clinical seizure seen in 550 cases followed by complex partial seizure in 245 cases as shown in table 2.

Table 2: Type of seizure at presentation

Type of seizure	No. of Cases	Percentages
Generalized tonic clonic	550	68%%
Complex partial seizure	245	30%
Absence	1	0.01%
Simple Partial	3	0.3%
Infantile spasms	3	0.3%
Myoclonic	6	1%

There was a wide spectrum of presentation at the time of admission, with most common symptom being fever (76%),followed by altered sensorium (58% cases) and headache (40%cases). There were 614 children who were febrile at the time of admission, reflecting infections as a major cause precipitating the abnormal movements either as URI, ASOM, diarrhea, meningoencephalitis, localized brain infections etc as shown in table 3.

Table 3: Symptoms Associated with Convulsions

Clinical Features	Cases	Percentage
Fever	614	76%
Rash	64	8%
Altered sensorium	468	58%
Headache	323	40%
Cough	307	38%
Vomiting	185	23%
Loose motions	121	15%
Pain abdomen	24	3%
Lethargy	387	48%
Ear discharge	24	3%
Trauma	7	0.8%
Focal deficits	131	16%
Todds palsy	16	2%

Serum Calcium

Of all patients, 24 (2.4%) had low serum Baseline serum calcium (<8.4%).

Serum Glucose

All the cases had their serum glucose level done, of which 16 had hypoglycemia(<70mg/dl).

Lumbar puncture was done in 387 cases (47%) which showed low CSF glucose in 94 cases; with CSF picture suggestive of viral meningoencephalitis in 8%, pyogenic in 6% and tubercular in 5.8% of the total cases.

For the uniformity of the protocol CT scan of the brain was done in all cases .There were abnormal findings in about 260 cases with tuberculoma in 40,TBM in 46, NCC in 89, trauma in 7 and miscellaneous malformations in 14.

EEG was done in those cases where high electrical activity were expected. We had 194 abnormal EEGs showing generalized epileptiform activity (100), focal lesions in 77 cases and benign rolandic epilepsy 17 cases.

Amalgamating, the history at presentation, clinical findings and laboratory analysis febrile convulsions were the most common cause of seizure in about 38 % of cases followed by CNS infections 35% cases and

idiopathic 16.9% of cases as shown in detail in table 4. There were 19 cases of congenital CNS infections, malformations and syndromic presentations.

Table 4: Etiology of Convulsion

Aetiology	Cases	Percentage
Simple Febrile seizure	226	28.2
Atypical Febrile seizure	80	10
Pyogenic meningitis	48	5.9
Tuberculous meningitis	46	5.6
Tuberculoma	40	4.9
Neurocysticercosis	89	11
Viral encephalitis	67	8.2
Idiopathic Epilepsy	137	16.9
Acute infarcts	8	0.9
TORCH infections	3	0.3%
Benign Rolandic Epilespy	17	2.9
Hypocalcaemic	24	2.4
Hypoglycemia	12	1.5%
Trauma	7	0.8
Miscellaneous	16	1.9

DISCUSSIONS

Seizures are the most common peadiatric neurologic problem which presents as a medical emergency, perplexing both the parents and the paediatricians. Due to the protean manifestations and scarcity of literature regarding the seizures, still there is a lacunae in the whole some approach for the management of the same. To emphasize on the evidence based management of seizure, the present study was done in our hospital over a period of four years among the children of age group of 1 month to 18 years.

The incidence of seizure in our study was nearly 6.9%, which is similar to the findings of other authors[1,2]. There was slight male preponderance in our study with 468 boys and 340 girls . One of the reasons for this finding could be that conditions like febrile seizure are more common in males (male to female sex ratio of 1.4 to 1.2 :1)[4,5,6,7].

There was an age wise variation of incidence of the seizure with maximum number of cases below five years and minimum between 13-15 years. The maximum numberwere between 1 year to 3 years closely followed by 1month to 1 year and then 3 to 5 years group. Seizures have been found to have a higher incidence in younger children in many studies with a decreasing frequency in the older age group[1,8,9]. A survey done to know the prevalence of epilepsy, found that the peak age of onset was around 1 year and 90% of the attacks occurred during the first three years [7].

In our study the most common clinical type of seizure was GTCS followed by CPS. The literature tells generalized tonic clonic, (GTC) seizures are the most common type of childhood seizures, occurring in almost 61% of cases[7,9,10]. Generalized epilepsies were twice as common as partial epilepsies in one community survey, possibly due to the over estimation as generalized tonic clonic seizures are more dramatic and more likely to be noticed[6]. Partial seizures are generally less common with an exception to developing countries with high incidence of neurocysticercosis, where partial seizures are reported commonly[12].

The most common presenting symptom was fever (76%) followed by altered sensorium(58%),lethargy (48%), headache(40%), cough(38%), vomiting(23%), loose motions(15%), rash (8%), pain abdomen(3%) , ear discharge, focal deficit. Infectious causes of fever such as tonsillitis, upper respiratory tract infections and otitis media as precipitants to seizure are also noted by others.There are studies which reported diarrhea as a highly associated symptom in patients with seizures, and rotavirus infection was an identified etiology[11]& also rotavirus related seizures could occur in both febrile (41%) and afebrile (59%) children[12].Only 16% seizures were associated with neurological deficit which was slightly higher than reported earlier[7].

Of the 387 CSF examinations done, 94 were abnormal. 54% of them had an elevated protein level, while 27 % had low CSF glucose. An elevated PMN count suggests bacterial meningitis while lymphocytosis indicates aseptic, tuberculous or fungal meningitis ;elevated CSF protein indicates infectious, immunologic, vascular or degenerative etiology or tumors of brain and spinal cord while hypogylcorrachea is classically suggestive of pyogenic etiology[6].

CT scan was performed in all patients which revealed abnormalities in 32% cases(n=260) including diffuse cerebral edema (9%) , basal exudates, hydrocephalous, cerebral atrophy, ring enhancing lesions, malformations and tauma. Maytal et al concluded that routine practice of obtaining brain CT scans for all patients with new onset of nonfebrile seizures is unjustified. Emergent CT is not indicated for patients with no known seizure risk factors, normal neurological examinations, no acute symptomatic cause other than fever, and neurological follow up. For these patients, referral to a pediatric neurologist fir further workup, including EEG and the more diagnostically valuable MRI would be appropriate[13].

EEG is recommended as part of the neurodiagnostic evaluation of the child with an apparent first unprovoked seizure[12] . It is not helpful in children with simple febrile seizures but are probably most helpful if there is doubt about whether FS has really occurred, because EEGs carried out on the day of the seizure are abnormal in as many as 88% of patients [13]. We found EEG abnormalities in 194 cases, with maximum number showing generalized epileptiform activity (100) followed by focal trigger in 77 cases. The electrical activity resembled benign rolandic epilepsy 17 cases.

There were a total of 306 case of febrile seizures with typical cases being 226 in number(28.2%). The Yelandur survey[16] estimated the prevalence to be 3.28-5.71 per 1000 whilst the more recent Uttarakhand survey found a prevalence of 2.27 per 1000 population[14].

Infective pathology like bacterial and viral meningoencephalitis accounted for 5.9% and 8.2 % cases respectively. Bacterial meningitis as been ascribed differently as a cause of seizure varying from as low as 0.4-1.2% to 13%[5,16].

We found neurocysticercosis in 11% cases(n=89), which is slightly lower than that of other reported seri es 24.4% of active lesions and 9.9% calcified granuloma of NCC as a cause of seizures[12].

We had 5.6% (n=46) TBM cases and tuberculoma 4.9%(N=40) . Murthy et al have reported that approximately 50% of children and 5% of adults with tuberculous meningitis manifest seizure at some point of time[18].

Metabolic causes like hypocalcemia and hypoglycemia were present in 2.4%(n=24) and 1.5%(n=12) children respectively. Hypocalcemic seizures have been found as high as 13% to 25.6% of cases in the age group of 1month to 1 year[5].Of course in developing countries rickets with hypocalcemia is a leading cause of afebrile seizures in toddlers.

We had 137 (16.9%) idiopathic cases of seizure. A German study reveals as high as 47% cases of epilepsies to be idiopathic in origin, and also generalized epilepsies are twice more common than focal in being idiopathic[19].

CONCLUSION

Childhood seizures are common neurological problem with maximum number of cases occurring at a younger age group. Pediatricians have to be vigilant on subtle clinical manifestations and a stepwise approach to the diagnosis and management of it while keeping the age specific etiological variation in mind. Improvement of basic health facilities, hygiene and immunization can bring down the various infective causes of seizures. Enabling the parents through the awareness programmes can facilitate the overall success in the good results of outcome of the seizure episodes.

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REFERENCES

1. Adhikari S, Sathian B, Koirala DP, Rao KS. Profile of children admitted with seizures in a tertiary care hospital of Western Nepal. BMC Pediatr. 2013;13:43 2. Hauser WA. The prevalence and incidence of convulsive disorders in children. Epilepsia. 1994;35(2):1–6.
2. Dugar S., Rajput CS, Bhave S., Waydande S.Clinico etiological co-relation of seizure disorder in childhood diseases.IJAR.2015; Vol.3,Iss12,1366-72.
3. Ettore Beghi, Arturo Carpio, Lars Forsgren, Dale C. Hesdorffer, Kristina Malmgren, Josemir W. Sander, Torbjorn Tomson, W. Allen Hauser: Recommendation for a definition of acute symptomatic seizure. Epilepsia. April 2010; 4: 671-675.
4. Kalra V. Seizure epilepsy N nonepileptic events. In: Parthasarathy A, Nair MKC, Menon PSN editors. IAP Textbook of Pediatrics. 6th Ed. New

Delhi: Jaypee Brothers; 2016. p. 326-44.

5. Barathi M et al. Etiological evaluation of convulsions in chidren between 1 month to 5 years of age. Int J Contemp Pediatr.2017 Sep;4(5):1811-1816.
6. Udani V. Pediatric epilepsy – An Indian perspective. Indian J Pediatr 2005; 72 (4): 309-313.
7. Arzimanoglou A, Guerinn R, Aicardi J (editors). Febrile convulsions. In :Aicardi's Epilepsy in children. 3Rd ed. Philadelphia, Lippincott Williams and Wilkins; 2004. p.38-50.
8. Chen CY, Chang YJ, Wu HP. New-onset seizures in pediatric emergency. Pediatr Neonatol. 2010 Apr;51(2):103–11.
9. Chung B, Wat LC, Wong V. Febrile seizures in southern Chinese children: incidence and recurrence. Pediatr Neurol. 2006 Feb;34(2):121–6.
10. Saravanan S. Profile of children admitted with seizures in a tertiary care hospital in South India. IOSR-JDMS. 2013;11(4):56–61.
11. Mwipopo EE, Akhatar S, Fan P, and Zhao D. Profile and clinical characterization of seizures in hospitalized children. Pan Afr Med J. 2016; 24: 313.
12. Basu S, Ramchandran U, Thapliyal A. Clinical profile and outcome of pediatric neuro-cysticercosis: A study from Western Nepal. J Pediatr Neurol. 2007;5: 45–52.
13. Wong V. Acute gastroenteritis-related encephalopathy. J Child Neurol. 2001 Dec;16 (12):906–10.
14. Maytal J,Krauss JM, Novak G, Nagelberg J, Patel M. the role of brain computed tomography in evaluating children with new onset of seizures in emergency department.Epilepsia. 2000;41 (8):950-954.
15. Goel D, Agarwal A, Dhanai JS, Semval VD, Mehrotra V, Saxena V et al. Comprehensive rural epilepsy surveillance programme in Uttarakhand state of India. Neural India. 2009:57(3):355-8
16. Mani .The Yelandur study: Acommunity based approach to epilepsy in rural south India. Epidemiological aspects.seisure; 1998; 7: 281-8.
17. Cetinkaya F, Sennaroglu E, Comu S. Etiologies of seizures in young children admitted to an inner city hospital in a developing country. Pediatr Emergency Care.2008;24(11):761-3.
18. Murthy JMK. Tuberculous meningitis, the challenges. Neurology India: 2010 ;58(5):716-722.
19. Freiteg CM, May TW, Rating D. Icidence of epilepsies and epileptic syndromes in children and adolescents:A population based prospective study in Germany. Epilepsia 2001; 42(8): 979-985.
20. Fisher RS, Acevedo C, Arzimanglou A, Bogaez A, Cross JH, Elger CE et al. ILAE official report: a practical clinical definition of epilepsy. Epilepsia.2014; 55(4):475-82.

Does Pregnant Mother Aware about PMTCT of HIV? What is their Attitude and Do they Practice the Measures on PMTCT of HIV?: A Narrative Review

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ABSTRACT

Introduction:-Human Immunodeficiency Virus (HIV) or Acquired Immunodeficiency Syndrome (AIDS) is a dreadful disease and it is more prevalent in the world [1]. In these circumstances people must have adequate knowledge on HIV/AIDS and its prevention .On account of that, this paper aims to assess the awareness, attitude and practices of pregnant women on HIV/AIDS, its transmission and prevention. **Method: -** A computerized search for published literature and journal articles was undertaken through Pub Med and EBSCO databases. Typical search strategies have used for each data bases .During initial search 12445 articles were retrieved and after screening 20 articles were selected for full text assessment and finally 8 articles were included in the study. **Results:-** Out of 8 literatures ,7 research studies concluding that there is a low level of awareness of HIV/AIDS, Mother to Child Transmission(MTCT) and its prevention and 1 study suggests that there is adequate knowledge among the pregnant women regarding HIV/AIDS ,mother to child transmission and its prevention. **Discussion:-**Various review of research studies published from 2017 to 2017 concluded that the level of awareness regarding Prevention of Mother to Child Transmission(PMTCT) of HIV among the pregnant women as well as the adolescents has been revealed in all the studies, whereas the attitude and practice on HIV/AIDS and its prevention has been concluded in two studies respectively.

Overall analysed data from the eight studies suggests the gap between awareness and practice. This gap can be eliminated when women lead a safe sexual life.

Conclusion--:- Effective use of Prevention of Mother to Child Transmission (PMTCT) of HIV services can be enhanced by changing the attitude towards HIV/AIDS and improving the awareness on HIV/AIDS and its prevention.

Keywords: *Awareness, attitude, practice, prevention of mother to child transmission, pregnant women.*

INTRODUCTION

Human Immunodeficiency Virus (HIV) or Acquired Immunodeficiency Syndrome (AIDS) is one of the dreadful challenges to human life and their dignity. It has adverse effects on all levels of society and has enormous impact on global economic and social development [1]. HIV and AIDS disease has been around the world, although no one has been able to pinpoint its origin.

Moreover there are many theories and beliefs which are floating around the medical world regarding the origin of HIV/AIDS, there are certain causes which is primarily responsible for the transmission of virus from one human to another, such as unprotected sexual intercourse, transfusion of infected blood products and from mother to child. Despite of having these many causes, still there are various myths and stigma existing in the world regarding the transmission of HIV [1]. Many people speak about the late stages of AIDS without knowing the facts that HIV does not produce AIDS always. The Prevention of Parent to Child Transmission of HIV (PPTCT) programme was launched in the year of 2002, in all major hospitals in five HIV prevalent states. At the end of 2016, there were 20756 integrated

counselling and HIV testing centre, all over India and mostly these services are offering by Government hospitals [2].

When we focus on the transmission of HIV, pregnancy is a period, where the transmission of virus from mother to child occurs and develops a condition that endangers both mother and baby. The epidemic of HIV has a devastating effect on children who are less than 15 years of age due to vertical transmission of HIV. So it's a crucial period, where the incidence of HIV should be prevented by mother and family members. For that what are all the requisites to be taken by them? Do they have adequate knowledge on prevention of mother to child transmission of HIV? What is their attitude towards HIV/AIDS? Do they practice it well before? [3]

Taking this into account; various studies have been conducted to assess the awareness, attitude and practice towards prevention of mother to child transmission of HIV among pregnant women.

NEED FOR THE STUDY

There is vast literature which suggests that the significant portion of population have low level of awareness and also have unfavourable attitude towards AIDS and its prevention. These are the threat to our country, as people are becoming the victim of HIV/AIDS. The latest estimate shows that India is the country where third largest number of people living with HIV in the world [4].

Evidence suggests that there is low awareness on timing of mother to child transmission of HIV as well as its prevention. Hence strengthening of PMTCT services are recommended in the antenatal care settings [5].

Researchers also concluded that the level of knowledge among pregnant regarding prevention of mother to child transmission of HIV is low. So appropriate strategies to be carried out to help them make informed decisions [6].

Keeping this in view it is very essential to focus on awareness attitude and practice of pregnant women towards HIV/AIDS and its prevention, to prevent the transmission of HIV from mother to baby and thereby to save the life of mother and baby and to lead a healthy life ahead.

AIM

The aim of this review is to assess the level of awareness and attitude of pregnant women towards PMTCT services as well as the various practices which has been followed by mother to prevent the transmission of mother to child transmission of HIV.

OBJECTIVES

- To assess the level of awareness, attitude and various preventive practices following by the mother who lives in the different part of the world to prevent the transmission of HIV from mother to child.
- To determine the demographic factors which is associated with the awareness attitude and practice on Prevention of Mother to Child transmission of HIV

MATERIAL AND METHOD

Search strategy method:

A computerised search have done to collect the articles which are available in different databases from the year of 2007 to 2017.The search strategy was limited to only English language and considered only the studies which are conducted on human species.

Initial search strategy made by using the terminologies and its synonyms which are processed in databases such as Pub Med and EBSCO. The terminologies which have been used to collect the article are as follows:

Keywords: awareness, knowledge, attitude, practice, utilization, prevention, mother to child transmission, perinatal transmission, HIV, ANC

Type of studies

Comparative studies, Descriptive studies, Cross-sectional studies.

Type of participants

Women in reproductive age, pregnant women, male and female adolescent

Settings

Antenatal clinics in hospitals, schools and obstetrics

and gynaecological clinics.

Outcomes

Findings from these studies will leads to a clearer understanding regarding the awareness, attitude and practice of pregnant women on Prevention of Mother to Child Transmission of HIV and will be act as baseline information in order to strengthen the prenatal educational programmes for the creation of awareness among the public. Thereby it enhances the utilization of PMTCT services.

RESULTS

Description of extracted data

Rastogi, Saumya, Charles Bimal, Sam E Asirvatham (2009) [6] conducted a cross sectional study to assess Knowledge of antiretroviral in preventing parent to-child-transmission of HIV among women living with HIV in Tamil Nadu, India and the findings suggested that One fifth of the participants were not having adequate knowledge about Prevention of Parent To Child Transmission of HIV and about 40% participants didn't know that ARV can prevent the transmission of HIV from parent to child and the findings concludes that while looking at the risk of transmission of HIV from an HIV infected mother to her child, the knowledge level regarding PMTCT and ARV among them is low and formulation of appropriate guidelines and strategies to generate awareness among them is to be taken into consideration.

Asfer Anteneh, Beyene Habtamu (2013) [5] carried out a cross sectional study to assess the awareness and knowledge on timing of mother-to-child transmission of HIV among antenatal care attending women in Southern Ethiopia. The analysed data found that all Antenatal women who attended the ANC were aware about HIV/AIDS and its transmission and only few of the pregnant women were aware that HIV is transmittable from mother to child during pregnancy, labour and delivery. So the available findings concludes that awareness and knowledge were law among pregnant women regarding the time of MTCT.

Emah Irene, Yakanana, Monebenimp, Fransecisca et al., (2009) [7] conducted a descriptive cross sectional study to assess the knowledge of pregnant women on Mother-to-Child Transmission of HIV in Yaoundé. The findings from the study revealed that almost 99% of the pregnant women had heard about HIV/AIDS and its transmission,hence it reveals that the pregnant women have good knowledge on HIV and PMTCT.

Haider, Glfareen., Zohra, Nishat., Nisar,Nusrat et al., (2007)[8] conducted a descriptive study to determine the knowledge about AIDS/HIV infection among women attending obstetrics and gynaecology clinic at a university hospital, Pakistan. The results from the study stated that out of total pregnant women 86% were heard about HIV/AIDS and the majority of women knew about its transmission. It concludes that the level of awareness on HIV/AIDS infection among pregnant women is satisfactory. But there are few misconceptions regarding transmission of HIV and that to be considered.

Bhavna T,Puwal., Dr.Vaibhavi,Patel., Dr.Sheetal, Vyaset al.,(2010)[9]carried out a Quantitative, Cross sectional study to assess the knowledge about transmission and prevention of HIV/AIDS among the high risk groups(HRG) population of Ahmadabad city. Findings from the study suggested that about 85% high risk groups aware about HIV and knew that the transmission rate was highest through sexual route. About half of high risk groups knew about all major modes of prevention. This study concludes that it is important to have adequate knowledge about transmission and prevention of AIDS among high risk group to change its high risk behaviour and improve the health.

ByamugishaRobert, Tumwine K James, Ndeezi et al.(2009)[10] conducted a cross sectional study to determine the attitudes to routine HIV counselling and testing, and knowledge about prevention of mother to child transmission of HIV among antenatal attendees in eastern Uganda. The result shown that almost all the ANC attendees had a positive attitude towards testing of HIV and the HIV status helped the women to lead a healthy life and about 65% of the participants have the knowledge that the HIV can transmit from her mother to baby. This study reveals that a routine check up HIV testing and counselling during the Antenatal period is largely accepted by the pregnant woman who are residing in Uganda.

Gupta Onam, Lal Dhruvendra & Sindhu Kaur (2016) [11] carried out a comparative study to assess knowledge, attitude and practice of HIV/AIDS among adolescents in Two Districts of Punjab. Results from this study stated

that total adolescents from different places heard about HIV/AIDS and many of them aware that HIV/AIDS could be prevented by condom. The result concludes that various interventions at different level is enquired to enhance the awareness among the adolescents as they are tomorrow's citizens.

Kuete Martin,Yuan Hongfens,Ite Qiuan et al(2014) [12] carried out a find out a cross sectional study to findout the Sexual Practices, Fertility Intentions, and awareness to Prevent Mother-to-Child Transmission of HIV Among Infected Pregnant Women at the Yaoundé Central Hospital**,** Cameroon. The results suggested that sexual desire has been significantly changed since their HIV diagnosis and about 19% of participants had multiple sexual partner .94 pregnant women with HIV infection provided appropriate information on socio-demographic character, sexual and fertility patterns and they have adequate awareness on preventing Mother to Child Transmission of HIV. Over all findings concludes that Cameroon women who infected with HIV and living with HIV infected partner, expressed high sexual and fertility intentions with severe unmet needs including safer sexual practice and conception

SUMMARY OF FINDINGS

Available 8 literature are quantitative and cross sectional studies. Out of 8 literatures ,7 research studies concluding that there is low level of awareness of HIV/AIDS and MTCT and its prevention and 1 study suggests that there is adequate knowledge among the pregnant women regarding HIV/AIDS ,mother to child transmission and its prevention.

DISCUSSION

A comprehensive review of research studies published from 2017 to 2017 found that the level of awareness regarding Prevention of Mother to Child Transmission of HIV among the pregnant women as well as the adolescents has been revealed in all the studies, whereas the attitude and practice on HIV/AIDS and its prevention has been concluded in two studies respectively.

Overall analysed data from the eight studies suggests the gap between awareness and practice. This gap can be eliminated when women lead a safe sexual life.

A favourable attitude towards HIV/AIDS and its prevention have the significant impact on the practices of adolescents and pregnant women towards the prevention of HIV transmission, from one person to another as well as from mother to baby.

Practices among the adolescents on prevention of HIV/AIDS are satisfactory. But their preventive practices only limited to the use of contraceptives during sexual intercourse. More precautions to be taken out by the adolescents throughout their life, in order to prevent the transmission of HIV from parent to child, also to have a healthy sexual life.

Implementation of certain awareness programmes to be encouraged among the adolescents and reproductive aged women helps them to have a satisfactory marital life.

IMPORTANCE IN EDUCATION

Today's children are tomorrow's citizens. Creating awareness on HIV/AIDS, its transmission and its preventive measures among the children in educational settings make the individual to follow the aspects of PMTCT services in the future. There by it helps the people to lead a healthy and safe life ahead. More over public educational programmes through mass media and prenatal educational programmes which focuses on the needed information regarding HIV/AIDS, its transmission and prevention will improve mother's awareness as well as the public.

So it is a great concern to give adequate information regarding PMTCT programmes in educational settings. By this we can strengthen the campaign and ensure the maternal and child survival.

FUTURE SIGNIFICANCE

The National AIDS Control Organisation states that annually there are estimated 29 million of pregnancies occur in India and around 35255 occur in HIV positive pregnant women. In the absence of preventive measures or intervention an estimated cohort of 10361 babies will be infected and born annually. Hence strengthening of PPTCT services is essential to prevent the perinatal transmission of HIV.So enhancing the awareness among pregnant women regarding PMTCT services ,will make them to have favourable attitude and it improve the practice on PMTCT services and thereby it helps to achieve the goal of reducing the number of children born with HIV.

LIMITATIONS

- Computerized data bases were limited
- Was limited to only in pregnant women
- Was limited to only English language

CONCLUSION

The number of HIV positive babies is higher in recent years. Lack of knowledge regarding poor diagnostic facilities, problems in Antiretroviral therapy (ART), these are the great concern which adversely affects PMTCT services.

Lack of awareness about HIV/AIDS, its transmission and prevention are the determined factors which facilitate the spread of HIV/AIDS in developing countries. So women living with or without HIV /AIDS, need to know the risk behaviour of pregnancy which affects their own health as well as the risk of transmission to their foetus or infants.

Strengthening of prenatal educational programme on HIV/AIDS with the emphasis on its preventive measures and various services available to prevent the Mother to Child Transmission of HIV, among the pregnant women seems to be necessary.

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REFERENCES

[1] AVERT organization. History of HIV & AIDS overview. (2017).Available from://www.avert.org

[2] Prevention of Parent to Child Transmission (2016).Available from http://naco.gov.in/prevention-parent-child-transmissionpptct

[3] Fact sheet. Latest statistics on the status of the AIDS epidemic [internet]. (2016). Available from www.unaids.org

[4] AVERT organization. PREVENTION OF MOTHER-TO-CHILD TRANSMISSION (PMTCT) OF HIV. (2017). Available from https://www.avert.org

[5] Asefa A, Beyene H, Asefa A, Beyene H. Awareness and knowledge on timing of mother-to-child transmission of HIV Women. 2003; 43(3):238-45.

[6] Rastogi S, Charles B, Sam AE. Knowledge of antiretrovirals in preventing parent-to-child-transmission of HIV: a cross-sectional study among women living with HIV in Tamil

[7] Bissek AC, Yakana IE, Monebenimp F, Chaby G, Akondeng L, Angwafor SA, Lok C, Njamnshi AK, Muna WF. Knowledge of pregnant women on mother-to-child transmission of HIV in Yaoundé. The open AIDS journal. 2011;5:25. Nadu, India.

[8] Haider G, Zohra N, Nisar N, Munir AA. Knowledge about AIDS/HIV infection among women attending obstetrics and gynaecology clinic at a university hospital. J Pak Med Assoc. 2009 Feb 1;59(2):95-8.

[9] Puwar BT, Patel V, Vyas S, Oza U, Kapoor R. Knowledge about transmission and prevention of HIV/AIDS among the high risk groups (HRG) population of Ahmedabad city. NHL Journal of Medical Sciences. 2015 Jan 1;4(1).

[10] Byamugisha R, Tumwine JK, Ndeezi G, Karamagi CA, Tylleskär T. Attitudes to routine HIV counselling and testing, and knowledge about prevention of mother to child transmission of HIV in eastern Uganda: a cross-sectional survey among antenatal attendees. Journal of the International AIDS Society. 2010 Dec 13;13(1):52.

[11] Gupta Onam, Lal Dhruvendra, Sindhu Kaur. Assessment of Knowledge, Attitude and Practice of HIV/AIDS Among Adolescents :A Comparative Study of Two Districts of Punjab. 2016 October ;2(4):76-82

[12] Kuete M, Yuan H, He Q, Kemayou AL, Ndognjem TP, Yang F, Hu Z, Tian B, Zhao K, Zhang H, Xiong C. Sexual Practices, Fertility Intentions, and Awareness to Prevent Mother-to-Child Transmission of HIV Among Infected Pregnant Women at the Yaounde Central Hospital. Sexual medicine. 2016 Jun 30;4(2):e97-105.

Recent Resting Habit of Adult *Phlebotomus argentipes* the Vector of *Visceral leishmaniasis* in a Kala Azar Endemic Foci of Bihar India

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ABSTRACT

From 1976 to 2014, DDT, and from 2015 till date, alpha cypermethrin insecticide is being sprayed as indoor residual spray up to 1.8 meter i.e 6 feet height in human dwellings as well as in cattle sheds in, India, as a part of Kala -azar elimination programme. This is being a practice out of the belief that *Phlebotomus argentipes* the vector of kala azar is endophilic in nature and cannot hop beyond 1.8 meters height. Sixteen months study was therefore conducted in three villages in a kala azar endemic block Warisnagar, district Samastipur, Bihar from September 2016 to November 2017 to note the vertical distribution of P.*argentipes* in indoors and their distribution in outdoors aswell. In all the three study villages, density of adult *P.argentipes* was found more in Cattle sheds than in human dwellings. Irrespective of IRS and non IRS villages, significant numbers (*p* value 0.47) of *P.argentipes* were found above 1.8 meter in CS and HD of which 33.37 percent were blood fed and gravid females. Sizable number of *P.argentipes* was also found in outdoor peridomestic situations throughout the study period. Therefore it may be the time to evaluate vector control strategies in kala azar endemic areas of Bihar for successful elimination of the disease from India.

Keywords: *Distribution of Phlebotomus argentipes in indoor and outdoor. Kala azar endemic villages. Bihar*

INTRODUCTION

Phlebotomus argentipes, the vector of visceral leishmaniasis or Kala azar in the endemic states like Bihar, West Bengal are predominantly endophilic in nature. They rest in cracks and crevices on walls, in dark corners of rooms, especially in mud huts and cattle sheds. They are found more in cattle sheds than human dwellings. It has also been noted that *P.argentipes do* not fly / rest above 1.8meter (6 feet) from ground level [1, 2, 3]. Since 1976, as a part of kala azar vector control programme, indoor residual spray with DDT was done in human dwellings and cattle sheds up to 1.8meter for control of *Phlebomus argentipes* in India. Noting the wide spread DDT resistance problem[4 , 5, 6, 7], since 2015 Government of India have started vector control programme with two rounds of IRS with Alpha-cypermethrine at the dose of 25mgm per sq.meter twice a year up to 1.8meter (6 feet) [7 ,8,]. The state of Bihar is yet to achieve successful Elimination of Kala azar , may be one of the reason that, the flies have changed their resting behaviours. A sixteen months study was conducted in a highly kala azar endemic Block Warisnagar, District Samastipur, Bihar starting from August 2016 till November 2017 to note the population of *P.argentipes* in different heights at cattle sheds and human dwellings as well as to note availability of the files in outdoor peridomestic conditions.

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MATERIALS AND METHOD

In comparison to India, Bihar state alone contributed more than 72 percent of total kala azar cases per year between 2012 to 2017 (Dpt. of NVBDCP. Government of India). Since 2014 district Samastipur, alone has contributed more than 8.5 percent Kala Azar cases of Bihar (Personal communication Dpt. NVBDCP.

Government of Bihar). Two villages i.e. Mannipur and Satmalpur which are reporting perennial transmission of kala azar and are under insecticidal pressure and village Kishanpur which is without any kala azar case in Block Warisnagar, were selected random method for the study.

All human dwellings and cattle sheds were searched thoroughly by standard entomological methods [9]. Cattle sheds and human dwellings had good density of *P.argentipes* were noted and marked. Out of marked houses, three human dwellings and three cattle sheds in each village were selected by random method. For outdoor collection, ten dark and damp outdoors with five to eight meters diameter surrounding each of the noted house and cattle shed were selected. In each village three human dwellings, three cattle sheds and ten peridomestic outdoor situations were selected for longitudinal study between August 2016 to November 2017. In each human dwelling and cattle shed , three CDC miniature light traps model 512, specially designed for sand fly collection (made by John W. Hock) were installed overnight at the heights of 0.6 meter (2feet), 1.2 meter (4feet) and above 1.8 meters (above 6 feet) by standard WHO method [9]. In outdoor situations ten CDC light traps per village were installed for overnight at a height of 0.6 meter (2feet) .

In each village a total of twenty eight light traps (nine in human dwellings, in nine cattle sheds and ten at peridomestic outdoor situations) were installed per night per months. The sand flies, collected in individual trap were brought to the laboratory separately and height wise species identification has been done by the method of Lewis [10].

RESULTS AND DISCUSSION

Results on distribution of indoor and outdoor population of *P.argentipes* in three study villages of block Warisnagar, district Samastipur are shown in Tables 1,2 and 3.

Month wise adult *P.argentipes* were collected from different heights from indoors of selected human dwellings and cattle sheds are shown in Table 1 and 2.

Village Kishanpur, is non endemic kala azar , sixteen months observation on density of *P.argentipes* from September 2016 to November 2017 is shown in Table 1.As per Table 1, 46.7% flies were found above 1.8 meter height in human dwellings. 26.5 and 27.8 percent flies were found up to 0.6 meter height in HD and CS respectively. 24.8 and 31.8 percent *P.argentipes* were also found up to 1.4 meter height in HD and CS respectively. Therefore statistically significant (*p* value 0.051) number of *P.argentipes* were found above 1.8 meters in unsprayed non endemic village Kishanpur. Very low density of *P,argentipes* in both human dwellings and cattle sheds were noted in the winter months between December 16 to February 2017. Density started increasing from the month of March on the onset of warm weather with a peak in the months of June-July and September – October.

Villages Mannipur and Satmalpur are endemic for Kala azar transmission and under Indoor Residual Spray (IRS) with Alpha-cypermethrin.

During study period, village Mannipur were sprayed in every third week of months September 2016, April 2017 and September 2017. Density of P.argentipes in different altitudes are shown in Table 2. lowest density was noted here in the winter months of December 2016 to February 2017. Throughout the study period 32.0 and 29.2 percent *P.argentipes* were found above 1.8 meter height in HD and CS respectively. It was noted that population of *P.argentipes* in CS (411) is more than that of in HD (366). Peak density was noted in September- October, 2016 and in the month of May 2017. Throughout the study period maximum number of flies in this village was found as 33.8 percent in HD and 43.2 percent in CS up to 1.4 meter height. (*p* value 0.390).

Village Satmalpur, as shown in Table 2, had a very high density of P.argentipes in CS as 962 in comparison to HD as 281.26.0 and 37.9 percent P.argentipes found above 1.8 meters in HD and CS respectively which is statistically significant with *p* value 0.565. 50.9 and 36.3 percent of P.argentipes were found within 1.4 meters in HD and CS respectively. Like other two study villages, minimum density was also noted in the winter months of December 2016 to February 2017 and maximum in the months of September, October 2016 and May 2017 in Satmalpur.

As per present observations, significant numbers (*p* value 0.051,0.390,& 0.565) of *P.argentipes* adults prefers to rest more in Cattle sheds than Human dwellings In villages Kishanpur,Mannipur and Satmalpur respectively, which corroborates with the early findings

of Smith [1], Hati et al [2, 3] . In earlier literatures it was mentioned that *P.argentipes* in India cannot hop or rest beyond 1.8 meters height [1,2,3,10] . In our present study is clearly showing presence of significant number (*p* value 0.47) of *P.argentipes* beyond the height of 1.8 meter in three study villages of which 33.37 percent females were full blood fed and gravid females.

The present observations corroborate with our previous four months observations from July to November 2016 in the same area [11]. Thus our present findings clearly show that *P.argentipes* adults have changed their behaviour over the period of time and significant numbers are available above 1.8 meter. This invites for a change in policy of IRS (*on the basis of findings*) by national programme.

Month wise and village wise number of *P.argentipes* collected by CDC light traps in outdoor and indoor are shown in Table 4. During the study period ten Light traps were installed per village per month in outdoor peridomestic situations. In indoor 18 traps were installed per month per village in different height in HD and CS. In outdoor no *P.argentipes* were trapped in the month of January 17 and Maximum numbers were recorded 122 (average 4.06/ trap/night) and 138 (average 4.6/trap/ night) in the months of May and June 2017 respectively. In indoor collection only 2 *P.argentipes* were trapped (average 0.03/ trap/night) in the month of January 2017. Maximum numbers were trapped 591(Average 10.94/ trap/night) in September"17, 494 (Average 9.14/trap/ night) in October 2016 and 341 (average 6.31/night/ trap) in the month of May 2017. Significant numbers of *P.argentipes* were found in outdoor (*p* value 0.001) in comparison to indoor (Table 3).

In the present study revels irrespective of IRS and non IRS villages *P.argentipes* found in greater numbers in cattle sheds than human dwellings. In general significant numbers (*p* value 0.47) were found above 1.8 meter height. They are also found in significant numbers (*p value* 0.001) in outdoor peridomestic situations. Therefore it is the time to evaluate vector control strategies in kala azar endemic areas of Bihar for successful elimination of the disease from India.

Table: 1 Month wise/Height wise density of P.argentipes in non kala azar endemic village Kishanpur, District Samastipur

Village	Kishanpur (C)							
Month & year	**Human Dwelling**				**Cattle Sheds**			
	I	**II**	**III**	**T**	**I**	**II**	**III**	**T**
September '16	11 17%	13 21%	39 62%	**63**	1 1%	75 38%	119 61%	**195**
October '16	9 26%	8 24%	17 50%	**34**	33 49%	31 45%	4 6%	**68**
November '16	2 22%	0 0%	7 78%	**9**	17 50%	10 29%	7 21%	**34**
December '16	1 50%	1 50%	0 0%	**2**	1 50%	0 0%	1 50%	**2**
January '17	0 0%	0 0%	0 0%	**0**	0 0%	0 0%	0 0%	**0**
February '17	0 0%	0 0%	3 100%	**3**	3 60%	2 40%	0 0%	**5**
March '17	3 38%	2 24%	3 38%	**8**	12 57%	6 29%	3 14%	**21**
April '17	0 0%	0 0%	0 0%	**0**	5 28%	4 22%	9 50%	**18**
May '17	8 47%	3 18%	6 35%	**17**	4 9%	5 11%	37 80%	**46**
June '17	14 54%	7 27%	5 19%	**26**	30 60%	10 20%	10 20%	**50**
July '17	0 0%	6 67%	3 33%	**9**	33 44%	10 13%	32 43%	**75**

Cont... **Table: 1 Month wise/Height wise density of P.argentipes in non kala azar endemic village Kishanpur, District Samastipur**

August '17	2 13%	6 40%	7 47%	**15**	0 0%	2 50%	2 50%	**4**
September '17	1 4%	2 7%	24 89%	**27**	10 91%	1 9%	0 0%	**11**
October '17	18 86%	0 0%	3 14%	**21**	1 25%	2 50%	1 25%	**4**
November '17	9 23%	20 50%	11 27%	**40**	5 21%	19 79%	0 0%	24
TOTAL	**78**	**68**	**128**	**274**	**155**	**177**	**225**	**557**
Percentage	28%	25%	47%		28%	32%	40%	

Abbreviations: **I** = Height up to 0.6 meter (2 feet). **II**= Height up to 1.4 meters (4 feet). **III** = Height above 1.8 meters (6 feet). C = control

Table 2 : Month wise / height wise density of Phlebotomus argentipes in kala azar endemic villages Mannipur & Satmalpur , District: Samastipur, Bhiar.

Village	Mannipur								Satmalpur							
Month & year	Human Dwelling				Cattle Sheds				Human Dwelling				Cattle Sheds			
	I	II	III	T	I	II	III	T	I	II	III	T	I	II	III	T
September '16	13 23%	35 63%	8 14%	**56**	38 48%	4 5%	37 47%	**79**	5 31%	2 13%	9 56%	**16**	56 29%	62 32%	75 39%	193
October '16	21 26%	43 54%	16 20%	**80**	10 15%	24 37%	31 48%	**65**	7 25%	17 61%	4 14%	**28**	40 27%	12 8%	98 65%	150
November '16	0 0%	1 14%	6 86%	**7**	2 24%	3 38%	3 38%	**8**	0 0%	3 75%	1 25%	**4**	12 10%	62 51%	48 39%	122
December '16	1 35%	0 0%	2 67%	**3**	7 78%	2 22%	0 0%	**9**	0 0%	0 0%	1 100%	**1**	1 20%	2 40%	2 40%	5
January '17	0 0%	0 0%	0 0%	**0**	0 0%	0 0%	0 0%	**0**	0 0%	0 0%	0 0%	**0**	0 0%	0 0%	2 100%	2
February '17	0 0%	0 0%	0 0%	**0**	1 100%	0 0%	0 0%	**1**	0 0%	1 100%	0 0%	**1**	0 0%	0 0%	1 100%	1
March '17	8 62%	3 23%	2 15%	**13**	15 27%	27 49%	13 24%	**55**	3 100%	0 0%	0 0%	**3**	1 25%	1 25%	2 50%	4
April '17	10 45%	10 45%	2 10%	**22**	23 32%	38 52%	12 16%	**73**	4 50%	2 25%	2 25%	**8**	5 29%	10 59%	2 12%	17
May '17	12 12%	37 36%	53 52%	**102**	12 26%	22 48%	12 26%	**46**	3 43%	1 14%	3 43%	**7**	52 46%	29 26%	31 28%	112
June '17	7 27%	7 27%	12 46%	**26**	8 29%	13 46%	7 25%	**28**	8 40%	6 30%	6 30%	**20**	9 26%	13 37%	13 37%	35
July '17	7 64%	4 36%	0 0%	**11**	4 57%	0 0%	3 43%	**7**	21 28%	53 71%	1 1%	**75**	17 26%	23 37%	23 37%	63
August '17	1 33%	1 33%	1 33%	**3**	1 25%	2 50%	1 25%	**4**	1 5%	15 71%	5 24%	**21**	3 16%	8 42%	8 42%	19
September '17	1 6%	8 50%	7 44%	**16**	13 76%	4 24%	0 0%	**17**	0 0%	8 38%	13 62%	**21**	23 21%	61 57%	23 21%	107
October '17	10 43%	5 22%	8 35%	**23**	16 100%	0 0%	0 0%	**16**	0 0%	17 39%	27 61%	**44**	29 22%	63 49%	37 29%	129
November '17	0 0%	4 100%	0 0%	**4**	2 67%	0 0%	1 33%	**3**	13 41%	18 56%	1 3%	**32**	0 0%	3 100%	0 0%	3
TOTAL	**91**	**158**	**117**	**366**	**152**	**139**	**120**	**411**	**65**	**143**	**73**	**281**	**248**	**349**	**365**	**962**
Percentage	25%	43%	32%		37%	34%	29%		23%	51%	26%		26%	36%	38%	

Abbreviations: **I** = Height up to 0.6 meter (2 feet). **II**= Height up to 1.4 meters (4 feet). **III** = Height above 1.8 meters (6 feet).

Table 3 : Comperative Month wise/Village wise density of *P.argentipes* trapped from Indoor and Out door

Month & Year	OUTDOOR					INDOOR					Avg Ratio
	Kishanpur	Mannipur	Satmalpur	Total	Avg den/ N/T/Vill	Kishanpur	Mannipur	**Satmalpur**	**Total**	**Avg den/ N/T/Vill**	**OD:ID**
September '16	14	32	31	**77**	**2.56**	258	135	198	**591**	**10.94**	01:05
October '16	8	11	19	**38**	**1.26**	102	145	247	**494**	**9.14**	01:09
November '16	6	12	24	**42**	**1.4**	43	15	171	**229**	**4.24**	01:04
December '16	0	0	2	**2**	**0.06**	4	16	5	**25**	**0.46**	03:23
January '17	0	0	0	**0**	**0**	0	0	2	**2**	**0.03**	00:03
February '17	3	0	1	**4**	**0.13**	8	3	0	**11**	**0.2**	13:20
March '17	22	3	7	**32**	**1.06**	29	68	129	**226**	**4.18**	01:04
April '17	14	38	31	**83**	**2.76**	18	95	24	**137**	**2.53**	01:01
May '17	19	77	26	**122**	**4.06**	63	148	130	**341**	**6.31**	02:03
June '17	62	41	35	**138**	**4.6**	76	50	90	**216**	**4**	01:01
July '17	25	24	46	**95**	**3.16**	84	18	138	**240**	**4.44**	03:04
August '17	1	7	19	**27**	**0.09**	19	7	40	**66**	**1.22**	00:01
September '17	4	43	17	**64**	**2.13**	38	30	164	**232**	**4.29**	01:02
October '17	17	47	19	**83**	**2.76**	25	5	173	**203**	**3.75**	02:03
November '17	3	7	22	**32**	**1.06**	58	7	35	**100**	**1.85**	01:01

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Conflict of Interest - Nil

Ethical Clearance: - Not required

REFERENCES

1. Smith R.O.A (1959). Bionomics of Phlebotomus argentipes . Bull: Cal;School of Tropical Medicine & Hygine,7 1959; 17
2. Hati Ak., Medical Entomology, (3rd Edition). Allied Book Agency. Kolkata:73. 2010(3rd Edition). 79-94
3. Hati, A.K. Current status of Leishmaniasis : vector biology. Proc Indo UK
4. Mukhopadhyay, AK, Saxena NB, Narasimham MV. Susceptibility status of Phlebotomus argentipes to DDT in some kala azar endemic areas of Bihar (india). Indian. J Med Res.1990;91: 458-60.
5. Singh R, Das RK, Sharma SK. Resistance of sandflies to DDT in some kala azar endemic districts of Bihar, India. Bull World Organ.2001;79:793
6. Operational Guidelines of Kala azar (Visceral leishmaniasis) Elimination in India- 2015
7. National Vector Borne Disease Control Programme. Government of India. 2015. 17-36.
8. Das Gupta R.K; Dhariwal A.C; Amrish Gupta. Kala azar: Roadmap for Elimination.

9. (2015) Journal of Indian Medical Association. 113(2): 183-185
10. .Mannual of Practical Entomology in Malaria. World Health Organization, Geneva.
11. Part II (1975)
12. Lewis D.J. The phlebotomine sand flies (Diptera: Psychodidae) of the oriental region
13. Bull Br Mus Nat Hist.(Ent.).1978; 37: 217-343
14. 12. Chandrima Das.Mahapatra T, KarthickM, Das Gupta. R.K, Nandi J, Mukhopadhyay A.K. Vertical distribution of indoor resting adult Phlebotomus(Euphlebotomus) argentipes the vector of kala azar in Kala azarendemic foci of Bihar, India. Int. J. Curr. Res. Med. Sci. (2017). 3(1): 1-6.

Substance Use Disorder - Vital Hurdle in Sustainable Development of Nigeria

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ABSTRACT

On the global front, Millenium Developmental Goals (MDGs) were recently replaced with Sustainable Developmental Goals (SDGs) keeping in view the importance of inclusive growth. Thus, the SDGs have been designed so that people belonging to all economic strata can get benefitted by them. Differences in economic status can have severe consequences, including increased levels of drug addiction and related crimes. It creates a huge burden on the healthcare system on local level and on the society at large. This problem is very prominent in many sub-African countries, including Nigeria. This study made an attempt towards identifying and analyzing various factors that may be contributing towards economic disparities, its burdens on the society (with reference to substance use disorder, in particular) and the various inclusive growth measures that can contribute towards addressing this problem. All concerned stakeholders including government, semi-private, private organizations, NGOs and global organizations need to work together to handle the deteriorating conditions so that the situation can be brought under control before it gets too late.

Keywords: *SDGs, Financial inequality, Healthcare facility affordability, Addiction, Substance use disorder*

INTRODUCTION

The Millenium Development Goals (MDGs) were generated as part of the UN Millenium Declaration in September 2000[1]. However, the targets could not be achieved within the deadline of September 2015. The UN General Assembly, in September 2015, replaced the MDGs with Sustainable Development Goals (SDGs) with deadline of 2030[2]. An Inter-Agency and Expert Group on Sustainable Development Goal Indicators (IAEG-SDGs) has also been formed for monitoring the progress towards achieving these goals[3].

Like many other nations, Nigeria also failed to achieve the MDGs. The major reasons for this failure include improper resource management, pitfalls at the levels of bureaucracy, extreme poverty, strong presence of insurgent groups such as Boko Haram, unavailability of properly trained healthcare workers etc[4]. An UN report has indicated that in 2011, around sixty percent of the poorest human population lived in only five countries (China, India, Nigeria, South Africa and Uganda)[5].

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MATERIALS AND METHOD

Getting addicted to alcohol and other substances is growing into a major concern for the society. Mainly the target group is either women, adolescents or young adults. Once addicted, they become highly vulnerable and often move towards anti-social activities. They also become cause of huge healthcare expenitures (both aimed towards treatment and rehabiliation). This study aimed towards understanding the current situation in this context with reference to Nigeria, in particular. For this purpose, various publications, articles and reports available and related to it were searched for, reviewed and analyzed. Rising levels of poverty, inequality in availability and distribution of basic facilities (such as food, housing, sanitation, primary healthcare facilties and education), unemployment and presence of insurgent

groups are pushing a significant proportion of the Nigerian population towards substance abuse disorder.

FINDINGS

Overview of Substance use disorder

Drugs abuse could be seen as making bad use of drugs, wrong usage of drugs alone, but it includes buying and using of drugs for treating self without doctor's prescription [6].Law enforcement official said drugs abuse is the use of illicit drugs[7]. And medical authorities see drug abuse as the failure of the people or patient to comply with directions for using prescribed medicines, engaging in dangerous self medication. Substance use disorder has been a topic of interest to many professionals in the area of health, particularly mental health. An area with enormous implication for public health, it has generated a substantial amount of interest in the field of research[8].

Epidemiological survey all over the world has indicated that substance use disorder is common and is one of the most disturbing health related problems among the youth[9-14]. The situation is not different in Nigeria, and several studies have reported their widespread presence[15-18]. Substance use disorder is primary reason why many youths are incarcerated as well as a source of crime and health problems in our society today. It has become unprecedental in Nigeria that the number of youth incarcerated in various prisons across the country has increased dramatically over the last few decades: Majority of these youths have been arrested for substance offences, either drugs, alcohol or tobacco addiction.

Substance use disorder remains a public health problem in many countries, Nigeria included, and are associated with many social and economic factors[19,20]. The disorder mostly starts among school children during adolescence stage, as a result of the several factors including peer group influence, curiosity, bad friends, environment, social pressure, the school and "I don't care attitude from teachers", self medication[21-23].

Using these substances for prolonged periods can have severe consequences, both at the level of the individual as well as the society. Some of the most prominent damages include increased rates of diseases such as cancer and sexually transmitted diseases, higher numbers of homicides and suicides, personality disorders, higher incidences of depression, increased frequency of unplanned sexual activities, increase in the number of school dropouts, higher rates of crime, higher rates if unemployment, leading to poverty [24-26].

World scenario on Substance use disorder

Survey in the United Kingdom indicated that 5-20% of secondary school students use substance with 2-5% , using them weekly and with a peak prevalence at 14-16 years of age [27,28]. A baseline survey on drug use and abuse commissioned by the National Agency for Campaign against drug abuse in the year 2001 and 2006 revealed that more than a fifth of secondary school, students in Kenya have taken alcohol and the figure rise to more than three-fourth for university students (Republic of Kenya, 2004). It has been observed that in Kenya, more than 22.7% of secondary school students have taken alcohol 68% among university [11]. A large number of students across all age groups have been exposed to alcohol, tobacco, Mirae (khaf), bhang and marijuana, and even substance such as heroine and cocaine [29,30].

Most of these young people begin with alcohol, cigarette, Indian hemp, abasic gum solutions and cough syrups, and later progress to more dangerous ones such as heroine, cocaine [29,30]. The menace of drug abuse in socio-economic, political, health education section brings a setback in our day to day life. The probable adverse effects of these psychoactive substances have caused international concern over many years and international legislations have been enacted at various times to control their circulation and use. These include formation of United Nations International Drug Control Programme (UNDCP) and surveys conducted by this organization [31].

Situation of Substance use disorder in Nigeria

International drug trafficking is becoming a growing concern for Nigeria. Reports have shown that at least five states of Nigeria (Kano, Borno, Kaduna, Rivers and Plateau) are heavily involved in this process and show a coorelative increase in levels of violence and unrest [32]. It has also been found that dependence on drugs is also being exploited to gain political mileage [33]. In addition to well known narcotic drugs (mainly marijuana and cannabis), prescription drugs (such as codiene syrup, tramadol and Rohypnol) are also being for drug abuse. Studies have shown that even these prescription drugs, when consumed in excess quantities can lead

to impairment of judgemental abilities and withdrawl symptoms similar to hard drugs [34].

Just like many other countries, the healthcare, rehabilitation and accesory support systems that are available for catering to the needs of these growing numbers of patients suffering from substance use disorder in Nigeria are inadequate [35].

Moreover, although Nigeria has bodies such as National Directorate of Employment (NDE), National Economic and Empowerment Development Scheme (NEEDS) and National Poverty Eradication Programme (NAPEP) which have been established with the aim of reducing/alleviating poverty and unemployment among youths, both of them remain serious threats till date [36]. This has led to increase in frustration and hopelessness among the youth thereby pushing them towards temporary solitude in drug addiction.

Measures that can be implemented to improve the existing scenario

Since the problem of substance use disorer has multiple contributing factors ranging from non-availability of basic requirements for survival with dignity to corruption and high crime rates, preventive measures are required to take care of each of these lacunae.

The existing healthcare system needs a complete overhaul. It has been found that there is shortage of drug rehabilitation trvatment centres worldwide, and Nigeria is no exception [35]. Formation of special ''community-care centres'' with participation of members from the community can serve to fill this gap as these patients can be holistically treated by joint efforts of these community members and healthcare workers. The government should encourage such "treatment-focussed policies" as they have shown promising results in other countries [37].

Since Nigeria is the most populated country in the African sub-continent [38], special priority must be given towards an effective policy of inclusive growth. This will ensure that the basic amenities reach the most economically deprived citizens. This, in turn, will help in overall upliftment of their lifes, in terms of food security, education, access to healthcare facilities and employment [39]. Moreover, they will become more aware of the pitfalls of getting into drug addiction. Awareness, thus generated, will also empower them to stand up to drug traffickers and corrupt administrators.

National policies must also be developed so that corruption can be handled across all levels. In fact, the National Drugs Law Enforcement Agency (NDLEA) was established in 1985 with the aim of curbing drug trafficking and making provisions for punitive measures against all those who would get involved in this process [40]. The National Agency for Food and Drug Administration and Control (NAFDAC) should also be provided with adequate power and logistic support so that it can monitor production of banned habituating products. Anybody found guilty of promoting or helping in the process of drug addiction or drug trafficking should be subjected to very harsh punishments.

CONCLUSION AND FUTURE DIRECTIONS

This study aims to give an overview of the factors that are leading to the increasingly disturbing trend of getting addicted to unwanted substances and prohibited drugs. The most severely affected group is very young in age. The factors which are primarily responsible for this inclination range from poor economic status of the family to distorted environment in which the child is forced to stay. Differential distribution of healthcare and educational facilities accross various sub-sections of the population and its subsequent effects on the society are equally responsible for their increased incidences among children, adolescents and young adults. This study also aimed towards analysing how alterations in the economic status might affect this distribution pattern, especially among Nigerian populations. Inclusive growth models that pay due attention towards addressing this issue are urgently required for being able to remove these economic differences and the downstream effects.

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REFERENCES

1. United Nations Millennium Project. Who they are. Retrieved from http://www.unmillenniumproject.org/goals/on November 11, 2015. Google Scholar
2. UN. Transforming our world: the 2030 Agenda for Sustainable Development. New York: United Nations, 2015. https:// sustainabledevelopment.un.org/post2015/transformingourworld (accessed

Sept 14, 2015).

3. IAEG-SDGs. Report of the Inter-Agency and Expert Group on the Sustainable Development Goal Indicators. New York, NY: Economic and Social Council, 2016. http://unstats.un.org/unsd/statcom/47th-session/documents/2016-2-SDGs-Rev1-E.pdf (accessed July 15, 2016).
4. Oleribe, O. O. and Taylor-Robinson, S. D. Before Sustainable Development Goals (SDG): why Nigeria failed to achieve the Millennium Development Goals (MDGs). Pan African Medical Journal. 2016; 24:156 doi:10.11604/pamj.2016.24.156.8447
5. United Nations. The Millennium Development Goals Report 2015: 2015 – Time for Global Action for People and Planet. United Nations, New York. Google Scholar
6. Jonas, M. (2005). Mosby's dictionary of complementary and alternative medicine. Elsevier.
7. Abiodun, A. O. Adelaken, M. L. Ogunremi Obanya A. O. (1998). Pattern of substance abuse among secondary school students in Ilorin, Nigeria. Latest African Journal of Medicine 13, 7, 91.
8. Belfer, M. L. (2003). International child and adolescent mental health review (pp. 17–22). Geneva: WHO, Department of Mental Health and Substance Dependence.
9. Yeung W. Substance misuse in secondary school students in Hong Kong. Psychiatric Bulletin 1997; 21:561-562.
10. Wu, L., Woody, G. E., Yang, C., Pan, J., & Blazer, D. G. (2011). Racial/ethical variations in substance-related disorders amongst adolescents in the United States. Archives of General Psychiatry, 68, 1176–1185.
11. Lamptey, J. J. (2005). Socio-demographic characteristics of substance abusers admitted to a private specialist clinic. Ghana Medical Journal, 39, 2–7.
12. Betencourt, O. A., & Herrera, M. M. (2006). Alcohol and drug problems and sexual and physical abuse at three urban high schools in Mthatha. South African Family Practice, 48, 17–17c.
13. Ngesu, L. M., Ndiku, J., & Masese, A. (2008). Drug dependence and abuse in Kenyan secondary schools: Strategies for intervention. Educational Research and Reviews, 3, 304–308.
14. Bronwyn, M., & Charles, D. H. P. (2005). Access to substance abuse treatment services for black South Africans: Findings from audits of specialist treatment. African Journal of Psychiatry, 8, 15–19.
15. Abdulkarim, A. A. (2004). Opinion of adolescents on how best to tackle the problem of drug abuse among students. Nigerian Journal of Paediatrics, 31, 144–145.
16. Egbuonu I, Ezechukwu CC, Chukwuka JO, Uwakwe R. Substance abuse among female senior secondary school students in Anambra state south Eastern Nigeria. Nigerian Journal of Clinical Practice 2004; 7(2): 53-55.
17. Adje, DEU1, Oyita, GI1, Eniojukan, JF. Substance Abuse among Adolescents: Prevalence and Patterns of Alcohol consumption among senior secondary school students in Abraka, Delta State, Nigeria. Sch. Acad. J. Pharm., 2015; 4(1): 63-69
18. Eniojukan, J.F. and Chichi, R.M. Substance Abuse among Adolescents: 1. Prevalence and Patterns of Alcohol Use in Benue State, Nigeria. IOSR Journal Of Pharmacy, 2014; 4 (12) :48-52
19. Stevanovic D, Atilola O, Balhara YPS, et al. The relationships between alcohol/drug use and quality of life among adolescents: An international, cross-sectional study. J Child Adoles Subst. 2015;24:177–185.
20. Moodley SV, Matjila MJ, Moosa MYH. Epidemiology of substance use among secondary school learners in Atteridgeville, Gauteng. S Afr J Psychiatry. 2012; 18(1):2–7.
21. Kalsi H. Substance abuse amongst high school and college students. Family medicine clerkship student projects. Book 45 [document on the Internet]. c2015 [cited 2015 Apr 14].
22. Wright JD, Pearl L. Knowledge and experience of young people regarding drug misuse, 1969-1994. Br Med J 1995; 310:20-24.
23. Yeung W. Substance misuse in secondary school students in Hong Kong. Psychiatric Bulletin 1997; 21:561-562.
24. Griffin KW, Lowe SR, Acevedo BP, Botvin GJ. Affective self-regulation trajectories during secondary school predict substance use among urban minority young adults. J Child Adoles Subst Abuse. 2015; 24(4):228–234.

25. Rezahosseini, O, Roohbakhsh, A, Tavakolian, V and Assar, S. Drug abuse among university students of Rafsanjan, Iran. Iran J Psychiatry Behav Sci. 2014; 8(2):81-85.
26. Thomson K. Overview of the drug abuse problem in South Africa [document on the Internet]. c2013 [cited 2015 Apr 29].
27. Miller, P and Plant, M. Drinking, smoking and illicit drug use among 15 and 16 year olds in the United Kingdom. Br Med J 1996; 313(7054): 394- 397.
28. Alcohol Concern. Straight Talk 15.Alcohol Concern, London, 2000.
29. Peter DR, Greydanus DE. Substance abuse: A paediatric concern. Indian Journal of Pediatrics 1999; 66: 557-567.
30. Siqueira LM, Brook JS. Tobacco use as a predictor of illicit drug use and drug related problems in Columbian youth. Journal of Adolescent Health 2003; 32: 50-57.
31. UNDCP (1999) Report of the rapid situation assessment of drug abuse in Nigeria. United Nations International Drug Control Programme, Nigeria.
32. Mukpo, A. Out of the shadows: Adopting a peacebuilding approach to the social effects of drug use in Nigeria, London: International Alert, 2017
33. Obasanjo, O. West Africa needs to wake up to threat from drugs trade, The Guardian, 26 June 2014, https://www.theguardian.com/global-development/poverty-matters/2014/jun/26/ west-africa-illegal-drugs-new-approach
34. Balal, A. NAFDAC laments consumption of tramadol, others, The Daily Trust, 7 February 2014, http://www.dailytrust.com.ng/daily/news/16313-nafdaclaments-consumption-of-tramadol-others
35. UNODC, Executive Summary, in UNODC, World Drug Report 2015, New York: UNODC, 2015
36. Surajo A.Z. and Zehadul Karim A.H.M. Youth Unemployment and Poverty in Nigeria: A Threat to Sustainable Growth and Development. International Journal of scientific research and management 2016; 4 (11): 4919-4928.
37. O'Neill, S.K. Demand side policies in the US war on drugs, Council on Foreign Relations blog, 6 September 2011, http://blogs.cfr.org/oneil/2011/09/06/demand-side-policies-in-the-u-s-war-on-drugs
38. Doing Business Report, 2014: Economic Profile Nigeria. World Bank Group
39. "The Growth Report: Strategies for Sustained Growth and Inclusive Development," Commission on Growth and Development (2008),https://openknowledge.worldbank.org/bitstream/handle/10986/6507/449860PUB0Box3101OFFICIAL0USE0ONLY1.pdf?sequence; E. Ianchovichina and S. Lundstrom, "Inclusive Growth Analytics: Framework and Application," Policy Research Working Paper no. 4851 (World Bank, 2009).
40. Eric, P. Socioeconomic Effects of Drug Abuse Among Nigerian Youths. Canadian Social Science 2017; 13 (1); 49-53

A Study of Urinary Uric Acid/Creatinine Ratio as an Additional Marker of Birth Asphyxia

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ABSTRACT

Perinatal asphyxia refers to an impairment of the normal oxygenation during parturition and the ensuing adverse effects on the fetus/neonate. It is one of the major causes of early neonatal mortality in India. Among the institutional births, incidence is 5% and accounts for 24.3% of neonatal deaths. It is an insult to fetus or newborn due to lack of oxygen (hypoxia) or lack of perfusion (ischemia) to various organs of sufficient magnitude and duration. The aim of the study was to observe the urinary uric acid to creatnine ratio in patients with perinatal birth asphyxia in a hospital setting. It was concluded that UUA/Cr concentration increase considerably after birth asphyxia, and the increase is associated with severity of HIE with a poorer outcome. Hence, UUA/Cr might have an important role in diagnosing and predicting the outcome of perinatal asphyxia.

Keywords: *Birth asphyxia, perinatal asphyxia, uua/cr ratio.*

INTRODUCTION

Perinatal asphyxia refers to an impairment of the normal oxygenation during parturition and the ensuing adverse effects on the fetus/neonate. It is one of the major causes of early neonatal mortality in India. Among the institutional births, incidence is 5% and accounts for 24.3% of neonatal deaths.[1] It is an insult to fetus or newborn due to lack of oxygen (hypoxia) or lack of perfusion (ischemia) to various organs of sufficient magnitude and duration.

Over 9 million children die each year during the perinatal and neonatal periods, and nearly all of these deaths occur in developing countries.[2] Birth asphyxia remains a major cause of global mortality, contributing to almost one quarter of the world's 3 million neonatal deaths and almost half of 2.6 million third-trimester stillbirths.[3] Every year approximately 4 million babies are born asphyxiated; this results in 1 million deaths and an equal number of serious neurological consequences ranging from cerebral palsy and mental retardation to epilepsy.[4]

In term infants, 90% of insults occur in the antepartum or intrapartum periods as a result of placental insufficiency. The remainder is postpartum usually secondary to pulmonary, CVS or neurologic abnormalities. The proportion of postpartum events is higher in premature neonates, especially in ELBW infants.[5] According to a study conducted at Thailand, inappropriate antenatal care, vacuum extraction, male sex, prolapsed cord and 1 and 5-minute low Apgar scores, were significant risk factors for hypoxic ischaemic encephalopathy (HIE).[6]

Outcome of birth asphyxia depends on apgar score at 5 minutes, heart rate at 90 seconds, time to first breath, duration of resuscitation arterial blood gases and acid – base status at 10, and 30 minutes of age.[7] Although apgar score does not exactly predict the neurodevelopmental outcome it is still the most feasible and practical to perform. The early outcome is either death/or presence of hypoxic ischaemic encephalopathy (HIE) stage I, II or III, according to Sarnat and Sarnat staging. Most of the HIE cases presented with depressed neonatal reflexes, seizures, lethargy, and papillary abnormalities. The common acid base disturbance was metabolic acidosis,

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observed mainly in babies with HIE stage III.[8,]

This study is to evaluate the utility of urinary uric acid to creatinine ratio (UA/Cr ratio) as marker for early, easy and cost effective detection of perinatal asphyxia and also find out co-relate with birth asphyxia and its severity with ratio of uric acid & Creatinine.

AIMS AND OBJECTIVES

To observe the urinary uric acid to creatnine ratio in patients with perinatal birth asphyxia in a hospital setting.

MATERIAL & METHOD

This prospective case-control study was carried out in the Department of Pediatrics at Muzaffarnagar Medical College, Muzaffarnagar College name . All the term babies (39-41 weeks) born in the hospital or delivered outside, were admitted in NICU of the hospital with Birth Asphyxia were included. Babies with other major illness or any congenital abnormality were excluded.

RESULTS

The cases comprised of 33 (66.0%) male & 17 (34.0%) females, controls consisted of 29 (58.0%) male & 21 (42.0%) female. While 16 (32.0%)cases & 12 (24.0%) controls were ≤ 2.5kg at birth, 34 (68.0%) cases & 38 (76.0%) controls were >2.5kg at birth as observed and recorded in the table. Further, whereas mean of birth weight of cases was 2.73±0.62 kg the same was 2.83±0.55kg for control group. While 14 (28.0%) Inborn among cases &35 (70.0%) Inborn among controls were afflicted with perinatal asphyxia, 36 (72.0%) Out born from among cases and15 (30.0%) from controls were found afflicted with the disease.

Table no 1: Distribution of perinatal asphyxia among inborn and out born neonates

Neonates	Case (n=50)		Control (n=50)	
	Frequency	Percentage	Frequency	Percentage
Inborn	14	28.0	35	70.0
Out Born	36	72.0	15	30.0

A great variety of perinatal risk factors for birth asphyxia were enumerated in the table 2. Out of eight number of risk factors for birth asphyxia mentioned in the table, major being Meconium Stained Amniotic Fluid (MSAF) 19 (38.0%), Assisted breech 14 (28.0%) and LOC(loop of cord around the neck)6 (12.0%). All other causes or **Risk factors** are commonly not encountered.

Table no 2: Distribution of perinatal risk factors for birth asphyxia

Risk factors	Case (n=50)	
	Frequency	Percentage
MSAF	19	38.0
Prolonged second stage	3	8.0
LOC(loop of cord around the neck)	6	12.0
Assisted breech	14	28.0
APH	3	6.0
Cord prolapsed	1	2.0
Difficult extraction by ISCS	2	4.0
Obstructed Labour	2	4.0

In medicine Sarnat staging, or the Sarnat Grading Scale is a classification scale for hypoxic-ischaemic encephalopathy (HIE), of the newborn, a syndrome caused by a lack of adequate oxygenation around the time of birth which manifests as altered consciousness, altered muscle tone, and seizures(table 3). Based on above while 10 (20.0%) cases were categorized under Stage-1, 31 (62.0%) under Stage-2 and 9 (18.0%) were placed under Stage-3. Of Sarnat Grading Scale

Table no 3: HIE staging distribution

HIE Staging	Frequency (n=50) (%)
Stage-1	10 (20.0)
Stage-2	31 (62.0)
Stage-3	9 (18.0)

Comparison between various parameters of cases and control group was made and results were tabulated. On perusal of the results we find that there was great difference in the mean values of Urinary uric acid (mg/dl), as well as the values of Urinary uric acid and creatinine ratio between the cases and controls (table 4). Variations in respect of both these values was statistically highly significant P<0.001. As for difference in the mean Urinary creatinine (mg/dl) values between the two groups the same was not significant P=0.536.

Table no 4: Comparison between various parameters of case and control group

Parameters	Case (n=50)	Control (n=50)	p-value
Urinary uric acid (mg/dl)	35.97±2.23	19.17±2.74	**<0.001**
Urinary creatinine (mg/dl)	12.13±3.14	11.74±3.14	**0.536**
Urinary uric acid and creatinine ratio	3.18±0.85	1.76±0.54	**<0.001**

Table 5,shows Co-relation with birth asphyxia and its severity with the ratio of uric acid & Creatinine was established and recorded in the table. On scrutiny we find that maximum no. of 31 neonates were under stage2 where Urinary uric acid and creatinine ratio was also maximum being 3.24±0.82.Under stage 1 & stage 2, where Urinary uric acid and creatinine ratio was3.04±1.02 &3.12±0.83 respectively, the no. of asphyxiated neonates were also 10 & 9 only. As such we may conclude that higher values of Urinary uric acid and creatinine ratio were attributable to the severity of perinatal asphyxia.

Table 5: Co-relate with birth asphyxia and its severity with ratio of uric acid & Creatinine

Parameters	Frequency (n=50)	Urinary uric acid (mg/dl)	Urinary creatinine (mg/dl)	Urinary uric acid and creatinine ratio
Stage 1	10	35.66±1.64	12.76±3.45	3.04±1.02
Stage 2	31	35.96± 2.36	11.85±3.11	3.24±0.82
Stage 3	9	36.28±2.47	12.34±3.12	3.12±0.83
p-value	-	0.833	0.721	0.806

DISCUSSION

Perinatal hypoxia is one of the leading causes of perinatal mortality in developing countries. Birth asphyxia is an important cause of static developmental and neurological handicap both in term and preterm infants (in 3 to 13% of infants with cerebral palsy (CP) have evidence of intrapartum asphyxia).[9] In addition to pulmonary, renal, and cardiac dysfunction, HIE develops in one third of asphyxiated newborns.[10] Mild encephalopathy carries a good prognosis, although in moderate and severe encephalopathy the risk of death or neurologic sequelae increases greatly.[11] Though there are more and more studies and understanding of the mechanisms leading to birth asphyxia, early determination of tissue damages due to birth asphyxia are still lacking. Brief hypoxia impairs cerebral oxidative metabolism leading to an anaerobic glycolysis to generate ATP. During anerobic conditions one molecule of glucose yields only 2 molecules of ATP as opposed to producing 38 molecules of ATP during aerobic conditions. During prolonged hypoxia, cardiac output falls, cerebral blood flow (CBF) is compromised and a combined hypoxic-ischemic insult produces further failure of oxidative phosphorylation and ATP production, sufficient to cause cellular damage. Lack of ATP and increase excitotoxic cellular damage leads to an accumulation of adenosine diphosphate (ADP) and adenosine monophosphate (AMP), which is then catabolized to adenosine, inosine and hypoxanthine. If there is uninterrupted tissue hypoxia and there is also reperfusion injury, hypoxanthine is oxidized to xanthine and uric acid in presence of xanthine oxidase leading to an increase in uric acid production, which come out in blood from tissues and excreted in urine.

Present study found that perinatal asphyxia is one of the commonest causes of admission and morbidity. In our study, males (58%) were affected more than females (42%) which is similar to a study done by Siva Saranappa SB et al[12] where males were 70% and 67% respectively. It is also comparable with most other studies where male dominance was recorded, 55.88% in study by Dongol et al[13] 55.5% in study by Kumar et al[14], 61% by Shrestha et al[15].

In this study, majority (100%) was appropriate for gestation age. Post maturity has been noted to be an important risk factor of birth asphyxia by earlier workers like Azam Multan which was not seen in this

study.[16] Among the maternal risk factors associated with perinatal asphyxia, MSAF was the major contributing factor, accounting for 38% of the cases. This study is comparable with the study done by Lalsclottir et al[17] in Iceland where 50% of the women of asphyxiated babies had meconium stain amniotic fluid. Bahubali Gane et al reported meconium stained amniotic fluid independently associated with perinatal asphyxia.[18]

The present study revealed significant increase in UA/Cr ratio in early spot urine samples from asphyxiated full term newborns and also proved positive correlation between the urinary UA/Cr ratio. In a study by Pallab Basu et al[19] it was found that urinary UA/Cr ratio was significantly higher in cases than controls (3.1± 1.3 vs 0.96 ± 0.54; p < 0.001) which is similar to our study. Another study by Bader et al[20] also showed UA/Cr was higher in the asphyxiated group when compared to controls (2,06 + 1.12, vs.0.64 + 0.48; P < 0.001) which is similar to our study The results of the present study were in concordance with those of Reem Mahmoud and Dina El Abd[21] who reported Urinary UA/Cr ratios were higher in asphyxiated infants (2.9 ±0.73) when compared with the controls (0.72±0.35, P<0001).

Purine degradation products such as hypoxanthine, xanthine and uric acid are useful clinical indicator of tissue hypoxia.[22] Detection of hypoxanthine and xanthine requires sophisticated techniques (like, High Performance Liquid Chromatography or HPLC)[23] and instruments which are impractical in maximum neonatal setup. But for urinary uric acid and creatinine estimations, only very simple instruments like photoelectric colorimeter or semi-auto-analyzer, simple reagents and simple techniques are required and can be acquired at low costs.

In the present study, majority 62% had Stage 2 followed by 20% stage 1 and 18% stage 3. It was seen that HIE stage I was the most common followed by HIE stage II and finally HIE stage III which is similar to present study. All Babies with HIE stage I had recovered and had a good prognosis while those with Stage III had all expired. Choudhary L et al in their study mostly babies were of stage 2 category and his study proved positive correlation between the urinary UA/Cr ratio and the severity (grading) of HIE (P<0.001). UUA/Cr ratios were significantly higher in infants with severe HIE (3.61 ± 0.61) when compared with infants with moderate HIE (2.95 ± 0.98: P<0.01) and those with mild HIE (2.64 ± 0.25: P<0.001). The values of the UA/Cr ratios in the mild and moderate HIE groups were also statistically significant (P<0.01). These patterns were also followed in present study but statistically non-significant. This may be possible due to small sample size.

Kumar et al. conducted a study on 110 neonates comprising 55 cases and 55 controls born in Rajendra Institute of Medical Sciences. Spot urine sample collected within first day of life. A cut-off urinary uric acid to creatinine (UA/UCR) ratio value of >1.14 was taken as the cut-off level. The urinary UA/UCR ratios were found to be higher in asphyxiated infants (2.58 ± 1.09) when compared with those in the controls (0.86 ± 0.17 which also is in favour of our study.

Thus the UUA/Cr allows rapid recognition of asphyxia and assessment of its severity and the potential for short term morbidly of death.

CONCLUSION

Currently diagnosis of perinatal insults relies on adequate documentation of general medicine and obstetrics factors and on radiological and laboratory assessments. But early identification of infants at highest risk for developing seizures to hypoxic ischemia is critical, so that therapeutic strategies can be facilitated. Many specific biomarkers are being investigated now a day to assess damage after perinatal asphyxia in neonates of which UUA/Cr is non-invasive, sensitive, early and cost effective. The most common perinatal danger component was MSAF (38%).

So we conclude that UUA/Cr concentration increase considerably after birth asphyxia, and the increase is associated with severity of HIE with a poorer outcome. Hence, UUA/Cr might have an important role in diagnosing and predicting the outcome of perinatal asphyxia. There exists still a need to study these parameters in the context of therapeutic hypothermia and how the parameters change over the period of treatment.

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REFERENCES

1 Neonatal Morbidity and Mortality. Report of the

National Neonatal Perinatal Database. Indian Pediatr 1999; 36: 167-169.

2 Hoque M, Haaq S, Islam R. Causes of neonatal admissions and deaths at a rural hospital in KwaZulu-Natal, South Africa. South African Journal of Epidemiology and Infection 2011; 26(1): 26-29.

3 Lawn J, Shibuya K, Stein C. No cry at birth: global estimates of intrapartum stillbirths and intrapartumrelated neonatal deaths. Bull World Health Organ. 2005; 83: 409-417.

4 Lawn JE, Manandhar A, Haws RA, Darmstadt GL. Reducing one million child deaths from birth asphyxia – a survey of health systems gaps and priorities. Health Res Policy Syst 2007; 5(1): 4

5 Chandra s, Ramji s, Thirupuram S. Perinatal asphyxia. Multivariate analysis of risk factors in hospital births. Indian pediatr 1997; 34: 206-212

6 Futrakul S, Praisuwanna P, Thaitumyanon P. Risk factors for hypoxic ischemic encephalopathy in asphyxiated newborn infants. J Med Assoc Thai 2006 89(3): 322-328.

7 Begum HA, Rahman A, Anowar S, Mortuza A, Nahar N. Long term outcome of birth asphyxiated infants. Mymensingh Med J 2006; 15(1): 61-65.

8 Chishty AL, Iqbal MA, Anjum A, Maqbool S. Risk factor analysis of Birth Asphyxia at the Children`s Hospital, Lahore. Pak Paediatr J 2002; 26: 47-53

9 Snyder EY, Cloherty JP. Perinatal Asphyxia. In: cloherty JP, Stark Ann R, editors. Manual of Neonatal Care, 4ed. Philadelphia: Lippincott-Raven Publishers, 1998: p 530.

10 Goodwin TM, Belai I, Hernandez P, Durand M, Paul RH 1992 Asphyxial complications in the term newborn with severe umbilical acidemia. Am J Obstet Gynecol 167:1506–1512

11 Finer NN, Robertson CM, Richards RT, Pinnel LE, Peters KL 1981 Hypoxicischemic encephalopathy in term neonates: perinatal factors and outcome. J Pediatr 98:112–117

12 Siva Saranappa S B, Chaithanya C Nair, Madhu G N, Srinivasa S, Manjunath MN. Clinical profile and outcome of perinatal asphyxia in a tertiary care centre. Curr Pediatr Res 2015; 19 (1 & 2): 9-12.

13 Dongol S, Singh J, Shrestha S, Shakya A. Clinical Profile of Birth Asphyxia in Dhulikhel Hospital: A Retrospective Study. J. Nepal Paediatr. Soc 2010;30(3):141-6.

14 Kumar A, Suruchi S,Kumar V, Pathak A, Banerjee DP. Clinical Profile and Short-term Outcome of Hypoxic Ischemic Encephalopathy among Birth Asphyxiated Babies in Katihar Medical College Hospital. Journal of Clinical Neonatology 2014;3(4):195-9.

15 Shrestha M, Shrestha L, Shrestha PS. Profile of asphyxiated babies at Tribhuvan university teaching hospital. J Nepal Paediatr Soc 2009; 29:3-5

16 Azam M, Malik F, Khan P. Birth asphyxia risk factors.The professional.2004; 11(4): 416-423.

17 Lalsclottir K, Dagbjartsson A, Thorkellsson T, Hardottric H; Birth asphyxia and Hypoxic Ischemic encephalopathy, incidence and obstetric risk factors. Laeknabladid 2007; 93(9): 595-560.

18 Bahubali Gane, Vishnu Bhat B, Ramachandra Rao, Nandakumar S, Adhisivam B, Rojo Joy, Prasad P, Shruti S. Antenatal and intrapartum risk factors for perinatal asphyxia: A case control study. Curr Pediatr Res 2013; 17 (2): 119-122.

19 Pallab Basu, Sabyasachi Som, Nabendu Choudhuri et al. Correlation between APGAR SCORE and urinary uric acid and creatinine ratio as a marker of Perinatal asphyxia. Indian Journal of Clinical Biochemistry, 2008;23(4) 361-364

20 Bader D ,Gozal D. Weinger-Abend M, Berger A et al. neonatal urinary uric acid and creatinine ratio as additional marker of perinatal asphyxia.Eur J.Pediatr 1995;154:747-9

21 Reem Mahmoud and Dina El Abd. Pediatric and Chemical Pathology Departments Faculty of Medicine, Cairo University. Urinary Uric Acid/ Creatinine Ratio in Term Infants With Perinatal Asphyxia.

22 Harkness RA, Whitelaw AGL, Simmonds RJ. Intrapartum hypoxia: the association between neurological assessment of damage and abnormal excretion of ATP metabolites. J Clin Pathol 1982; 35: 999 – 1007.

23 Harkness RA, Whitelaw AGL, Simmonds RJ. Intrapartum hypoxia: the association between neurological assessment of damage and abnormal excretion of ATP metabolites. J Clin Pathol 1982; 35:1000.

Incidence, Prevalence and Mortality of HIV/AIDS across different levels of Human Development Index: A Global Perspective

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ABSTRACT

Background: HIV/AIDS has asserted its pandemic status by claiming more than 35 million lives so far. The disproportionate burden of HIV/AIDS across the globe in terms of mortality, incidence and prevalence rates intrigued researchers to examine and evaluate the degree and direction of a two-way association between the global HIV/AIDS epidemic and national development across different levels of HDI to formulate the policies. The present analysis is to concentrate directional influence of HDI on these rates.

Data and Method: Age-standardized HIV/AIDS mortality, prevalence, and incidence rates of 179 countries were extracted from Global Burden of Disease Study 2015. The human development index along with its 4 components were obtained from Human Development Report 2016. The association between each of the rates and HDI was judged by Spearman correlation, Linear and Quantile regression analysis, and the Kruskal-Wallis test.

Results: HIV/AIDS mortality, prevalence, and incidence rates were found to be inversely correlated with national HDI ($r = -0.707, -0.677, -0.557$ respectively; $P < .001$), as well as the 4 indicators of HDI. Countries in Low HDI group were found to experience higher burden of HIV/AIDS in terms of these rates than that of Medium, High, and Very high HDI countries.

Conclusions: Lower development status characterized by low HDI values was found to increase the burden of HIV/AIDS around the world. Higher levels of deprivation in terms of Health, Education, and Economy were not only found to affect the overall well-being but might just raise the severity of HIV/AIDS across the regions. Hence for HIV/AIDS control or eradication, development could be the key aspect; hence recommended that special attention should be paid to develop an enabling environment in the countries of lower HDI groups.

Keywords: *HIV/AIDS, Mortality, Incidence, Prevalence, HDI, Quantile regression*

INTRODUCTION

Since the first reported case in the second half of twentieth century, Human Immunodeficiency Virus (HIV) leading to Acquired Immunodeficiency Syndrome (AIDS) had diversified prevalence, incidence and mortality rates across different regions had intensified attention of WHO and a huge number of medical and social scientists. In few decades since first outbreak, it shaped to pandemic status by claiming more than 35 million lives so far. As per WHO recent published factsheets, nearly 1 million people died from HIV related causes during past 1 year and currently the number of people living with HIV has hit approximately to an alarming level (36.7 million) whereas another 1.8 million people reported to be newly infected in 2016 globally.[1] Out of an estimated 6000 new infections that occur globally each day, two out of three are in sub-

Saharan Africa with young women continuing to bear a disproportionate burden.[2] Though between 2000 and 2016, the new cases of HIV infection fell by 39%, the incidence rate is still high among key populations and their partners.

In order to capture the variability in the spread of HIV/AIDS and to reassess the extent of the lethal threat it poses to the entire civilization and its development; prominent gaps were found to exist between developed, developing and least developed countries for incidence, prevalence and mortality in different age groups since the beginning of twenty-first century. Only, Sub-Saharan Africa countries accounted for almost two thirds of the global burden of new HIV infections. Through globalization of Antiretroviral Therapy (ART) and improved coverage of health facilities supported by National HIV programmes with better partners, it is expected that the wide gap in the incidence, prevalence and mortality related to HIV/AIDS between developed, developing and least developed countries should be narrowed. The reality, however, suggest that with the coexisting inequality and instability in different dimensions of lives across different regions as reflected by social, economic and health indicators, there would always be a considerable amount of differences in the levels and patterns of HIV/AIDS epidemic across nations.

Human Development Index which has been constructed to measure the average achievements in three major dimensions namely Health, Education and Standard of living is designed to capture the variability in people's lives and overall well-being. Countries and regions with relatively poor performance with respect to HDI can be characterized by the poorer access to education and health facilities, lack of infrastructure, prevalent security risks, poverty and persistent endemic diseases as compared to those countries and regions which have made sustainable advancements to ensure human well-being. Persistent diseases and its high prevalence, incidence and mortality on the other hand impede development and hence reverse the social and economic gains that these countries are striving to attain.[3] As we could see in the case of Sub-Saharan Africa, the high prevalence of HIV/AIDS in adult working age population was considered to be one of the leading arguments for that region being deprived of earning demographic dividend.[4] In other words, it is a disease that particularly hits those who should be economically productive, and thus threatens not only health, but also the economic stability and potential of a country.[5] So far, the studies associating HIV/AIDS and human development had been carried out to assess macro implications of the disease either in African continent or in some of the African countries with devastating history of HIV/AIDS on purely regional basis.[6-8] One such study affirmed the need to look into the impact of HIV/AIDS on human development in Africa extending beyond health issues and it asserted that HIV/AIDS should and must be seen as a global development concern, affecting education and knowledge acquisition, income and social status, productivity and economic growth, and other direct and indirect components of human development such as gender equality and human rights.[3]

Through this paper we would like to shed some light on three different dimensional components of the current trajectory of HIV/AIDS in terms of incidence, prevalence and mortality rates across 179 countries and review the degree and direction to which HIV/AIDS epidemic is associated with human well-being that is measured by HDI and how the incidence, prevalence and mortality rates vary across these 179 countries as we classify them into 4 HDI groups.

OBJECTIVE

To present the overall variation of HIV/AIDS epidemic in terms of Incidence, Prevalence and Mortality rates for 179 countries and to provide quantitative evidence in support of the existing association between each of these rates with each component dimensions of HDI. Further, to propose dynamic models to predict the conditional mean and quantiles for Incidence, Prevalence and Mortality rates separately by taking HDI as predictor variable. And. finally, to depict the variability of the above rates across these 179 countries as well as across the 4 HDI groups (Very High, High, Medium and Low HDI groups).

DATA AND METHODOLOGY

Global HIV/AIDS epidemic

Mortality, prevalence and incidence rates of HIV/AIDS for 179 countries were extracted from Global Burden of Disease Study 2015.[9]

HDI

HDI is a composite index that measures the

average achievements in three basic dimensions e.g. Life Expectancy Index (LEI), Education Index (EI) and Income Index (II) derived from Life Expectancy at Birth (LEB), Mean Years of Schooling (MYS), Expected Years of Schooling (EYS) and Gross National Income per capita (GNI_{pc}) and was obtained from Human Development Report 2016[10] categorized as Very High (HDI ≥ 0.800), High (0.800 > HDI ≥ 0.700), Medium (0.700 > HDI ≥ 0.550), and Low (HDI < 0.550) HDI groups.

STATISTICAL ANALYSIS

The median values and inter quartile ranges were calculated and Kolmogorov-Smirnov test for each variable under study were performed to check the normality[11] and at the rejection of null hypotheses, Spearman correlation coefficients were calculated separately between each of these rates and HDI and its 4 indicators in order to establish the association. Further, linear regression and proposed separate linear regression models performed to predict the conditional mean of each of the 3 dependent variables (HIV/AIDS mortality, prevalence, and incidence rates) considering HDI as the independent variable (HDI). In order to understand the average effect of HDI at different quantiles of each of the dependent variable's conditional distribution, quantile regression analyses were performed.[12]

Kruskal-Wallis test followed by pairwise comparisons were carried to examine whether the differences in HIV/AIDS mortality, prevalence and incidence rates across the 4 HDI groups were statistically varying.[13] Statistical analyses were performed using SPSS 20 (IBM-SPSS Inc, Armonk, NY) and STATA (Stata Corp, College Station, Texas). P values < .05 were considered significant.

RESULTS

HIV/AIDS epidemic and national HDI

Each of the three rates e.g. mortality, prevalence, and incidence rates indicated (Kolmogorov-Smirnov test) non-normality of their distributions across the countries (P < .05). As indicated in table 1 of the listed countries 95% observed prevalence of HIV/AIDS were between 35.056 to 696.023 while annual incidence and mortality rates were between 3.114 to 49.835 and 0.596 to 20.307 respectively.

Table 1: Medians, Interquartile ranges and Kolmogorov-Smirnov test results of global HIV/AIDS epidemiological parameters per 100,000 individuals

Global HIV/AIDS epidemic	n	Median	Interquartile Range	Kolmogorov- Smirnov test (P value)
Mortality	179	4.119	0.596-20.307	.000
Incidence	179	12.431	3.114-49.835	.000
Prevalence	179	133.99	35.056-696.023	.000

The median, interquartile range corresponding to the HIV/AIDS mortality, incidence and prevalence rates across these 4 HDI groups presented in table 2 indicated that all the three rates were increasing significantly as one move from high HDI to low HDI. The median mortality, incidence and prevalence rates were 0.375, 2.514 and 44.87 among countries of very high HDI while these were 52.126,91.551 and 1232.03 among low HDI countries.

Table 2: HIV/AIDS mortality, incidence and prevalence rate across the categories of Human Development Index

HDI category	No. of countries	Mortality	Incidence	Prevalence
Very High	48	0.375 (0.208-1.301)	2.514 (1.21-3.93)	44.87 (19.24-101.91)
High	49	4.119 (1.23-8.95)	12.138 (3.994-23.75)	123.87 (31.426-335.24)
Medium	41	6.889 (2.342-33.701)	20.485 (7.20-81.23)	171.98 (66.70-1016.18)
Low	41	52.126 (20.924-115.198)	91.551 (36.297-252.601)	1232.03 (511.005-2914.98)

The pairwise comparisons between HDI categories revealed that HIV/AIDS related mortality and incidence rates differed significantly between each except between High and Medium HDI groups whereas prevalence do

differ significantly between each of the categories of HDI except between Very High and High HDI as well as High and Medium groups.

Table 3: Spearman correlation coefficients between Human Development Index (HDI), its 4 indicators, and HIV/AIDS epidemiologic parameters

Variable	Mortality	Incidence	Prevalence
HDI	-0.707***	-0.677***	-0.557***
Life expectancy at Birth, y	-0.753***	-0.727***	-0.613***
Mean years of schooling	-0.617***	-0.594***	-0.485***
Expected years of schooling	-0.660***	-0.627***	-0.520***
Gross national income per capita, $	-0.622***	-0.593***	-0.480***

The negative and highly significant value of correlation coefficients revealed that each of the 3 rates were inversely correlated with HDI as well as with each of its indicators.

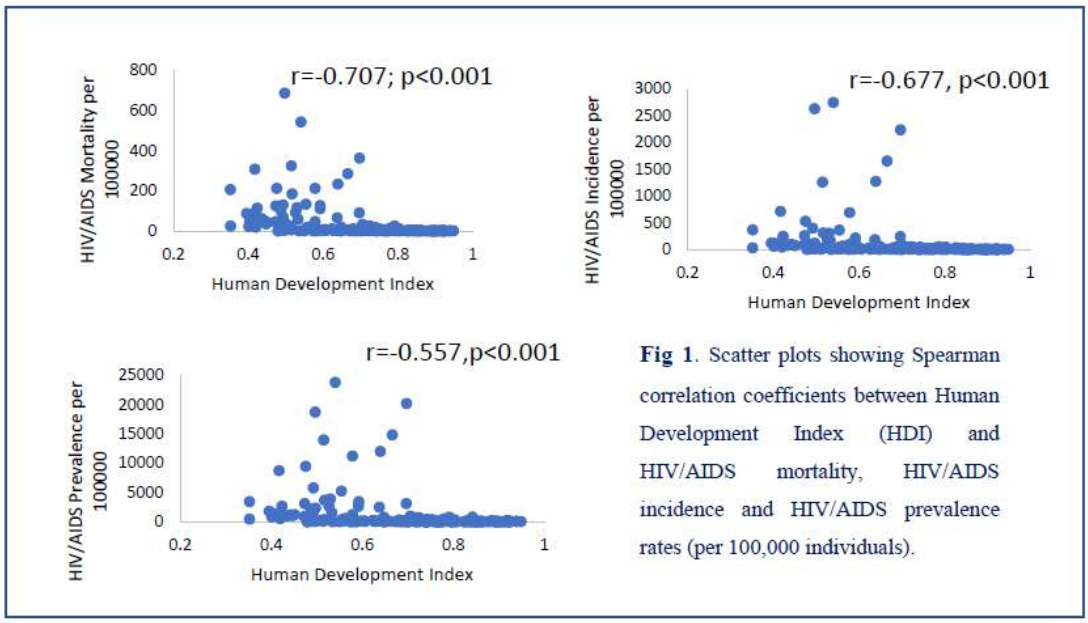

Fig 1. Scatter plots showing Spearman correlation coefficients between Human Development Index (HDI) and HIV/AIDS mortality, HIV/AIDS incidence and HIV/AIDS prevalence rates (per 100,000 individuals).

Among the 4 indicators of HDI the association of each of the rates was highest with LE (r = -0.753 with mortality, -0.727 with incidence, and -0.613 with prevalence) and lowest with GNI (r = -0.622 with mortality, -0.593 with incidence, and -0.480 with prevalence). table 3, fig 1

Table 4: Comparison of linear and quantile regression results using HIV/AIDS mortality, incidence and prevalence rate as dependent variables

Dependent Variable	Ordinary least squares coefficient estimate	Quantiles				
		0.10	0.25	0.50	0.75	0.90
Mortality	-222.547***	-2.091	-19.649***	-58.804***	-167.786***	-379.914*
Standard error	38.688	1.55	4.693	12.245	48.071	147.058
Incidence	-604.022***	-15.250***	-40.797***	-134.410***	-257.179**	-914.380
Standard error	175.527	3.866	9.204	23.971	92.377	699.14
Prevalence	-6613.414***	-37.813	-424.805**	-1736.044***	-3618.695**	-13231.43
Standard error	1571.27	31.960	135.366	324.393	1355.662	7665.4

From table 4, The results of Linear and Quantile regression analyses indicated that all the OLS coefficients were significant whereas the coefficients at .10 quantile corresponding to the conditional distribution of mortality and prevalence and at .90 quantile corresponding to the conditional distribution of incidence and prevalence were

found to be insignificant. It was also seen that at .25, .5 and .75 quantiles, HDI had significant inverse effect on HIV/AIDS mortality (b=-19.649, -58.804, -167.786; P<.001), incidence (b=-40.797, -134.410, -257.179; P<.001 and P<.01)) and prevalence (b=-424.805, -1736.044, -3618.695; P<.001 and P<.01) whereas at .10 and .90 quantile, HDI had no significant effect on the conditional distribution of prevalence (b=-37.813, -13231.43; P<.05).

DISCUSSION

Current epidemiology of global HIV/AIDS in terms of mortality, prevalence, and incidence rates, it was transparent that significant disparity existed in the burden of HIV/AIDS across different levels of Human Development table-2. HIV/AIDS related mortality, prevalence, and incidence rates were found to be inversely correlated with national HDI and its 4 indicators (i.e. life expectancy at birth, mean years of schooling, expected years of schooling, and GNI per capita). The situation worsened in case of those countries which belong to the lower HDI group according to the existing classification; that comprises countries mostly of Sub-Saharan Africa and thus the disproportionate burden of HIV/AIDS in terms of mortality, incidence and prevalence became more severe with the lower level of overall well-being as characterized by lower levels of HDI values.

HIV/AIDS related burden and different dimensions of HDI are expecting to exert a 2-way force; on one hand, the burden of HIV/AIDS directly affects important health and demographic indicators such as mortality rates and life expectancy resulting to bring down the National HDI, whereas poverty, illiteracy and poor health facilities and infrastructure further aggravate the HIV/AIDS related mortality, incidence and prevalence rates. It was estimated that in the 7 most affected countries in Africa, life expectancy declined by 12.1 years by 1995-2000 and expected to decline further by 29.4 years by 2010-2015.[3] Analysis of global inequality of life expectancy showed that 6 years of the difference in life expectancy between Africa and North America, the two extreme continents in terms of health and wealth, is due to HIV/AIDS.[14]

The OLS regression asserted that the National HDI had significant inverse effect on each of the rates i.e. with increase in the National HDI values, the corresponding national rates on HIV/AIDS mortality, incidence and prevalence would decrease. The Quantile regression analyses revealed that HDI was significantly negatively associated with HIV/AIDS mortality, incidence and prevalence rates at different quantiles, though as we move from .10 quantile to .90 quantile, the average inverse effect of HDI at these quantile points corresponding to the conditional distribution of these 3 rates were found to grow stronger.

The 2-way interaction between education and HIV/AIDS has been extensively discussed.[3,8,15] In the present study, it was found that years of schooling were reversely related to HIV/AIDS epidemic, hence needs to be enhanced especially in low- and medium-income countries being an essential component for human development. HIV/AIDS is one of the culprit reversing the trend toward the achievement of universal primary education in most African countries caused by death of AIDS parents resulting to economic status deterioration leading to increased number of children out of school (especially girls) that further impact on de-education of the future generation.[3,15] Undoubtedly, education can make a significant contribution to the prevention of HIV transmission and is the most important vehicle to combat HIV/AIDS.[16-17]

Many of the researchers have described AIDS as a disease of poverty and continue to make the vicious circle with the loss of young wealth-producing adults and the high cost of caring for those with AIDS. More than 60% of people living with HIV inhabit the world's poorest region: sub- Saharan Africa.[18] Even with the help of global organizations such as UNAIDS, a nation with low economic growth can hardly pay the cost of highly active antiretroviral therapy and prevention pro- grams.[19] Hence, the cyclical relationship is clear: poverty makes people more vulnerable to AIDS and AIDS generates poverty. This was verified in this study by the negative correlation between GNI per capita and HIV/AIDS mortality, prevalence, and incidences rates.

AIDS has been long considered as a disease at the core of a vicious circle, whereby the downstream effects of AIDS on socio- economic status and the upstream effects of socioeconomic status upon the risk of acquiring HIV.[18] The upstream effects were verified in our study with negative regression coefficients of HDI on HIV/AIDS mortality, prevalence, and incidence rates, which may due to the effects of poor education and poverty on HIV/AIDS.

CONCLUSION

Higher levels of deprivation in terms of Health, Education, Economy responsible for HDI are to affect the overall well-being by accelerating the spread of HIV/AIDS. Hence in order to control the rates of transmission in less development regions, HIV/AIDS sustained effective method of prevention and control programs need to be intensified.

Ethical Clearance: Not required.

Conflict of Interest: None

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REFERENCES

1. WHO HIV/AIDS factsheet accessed from http://www.who.int/mediacentre/factsheets/fs360/en/
2. Ayesha B.M. Kharsany and Quarraisha A. Karim. HIV Infection and AIDS in Sub-Saharan Africa: Current Status, Challenges and Opportunities. The Open AIDS Journal, 2016,10,34-48
3. Boutayeb A. The impact of HIV/AIDS on human development in African countries. BMC Public Health 2009;9(Suppl 1):S3.
4. Bongaarts J, R. A. Bulatao. Completing the Demographic Transition. Population and Development Review 25(3):515-529.
5. Bloom D. Realizing the Demographic Dividend: Is Africa any different. Program on the Global Demography of Ageing.
6. Arndt C, Lewis JD. The macro implications of HIV/AIDS in South Africa: a preliminary assessment. S Afr J Econ 2000; 68:380-92.
7. Nampanya-Serpell N. Social and economic risk factors for HIV/AIDS-affected families in Zambia. AIDS and Economics Symposium, July: Citeseer;2000.p.7e8.
8. Hoshi, T., Fuji, Y., Nzou, S. M., Tanigawa, C., Kiche, I., Mwau, M., & Kaneko, S.(2016). Spatial distributions of HIV infection in an endemic area of western Kenya: guiding information for localized HIV control and prevention. PloS one, 11(2), e0148636.
9. Global Burden of Disease Study 2015 (GBD 2015) Results. Seattle, United States: Institute for Health Metrics and Evaluation (IHME), 2016. Available from http://ghdx.healthdata.org/gbd-results-tool.
10. Human Development Report 2016
11. Rosenthal R. An application of the Kolmogorov-Smirnov test for normality with estimated mean and variance. Psychol Rep 1968;22:570.
12. Koenker R, Bassett G. Regression quantiles. Econometrica 1978;46:33-50.
13. Chan Y, Walmsley RP. Learning and understanding the Kruskal-Wallis one-way analysis-of-variance-by-ranks test for differences among three or more independent groups. Phys Ther 1997;77:1755-62.
14. Dorling D, Shaw M, Smith GD. HIV and global health: global inequality of life expectancy due to AIDS. BMJ: British Medical Journal 2006;332:662-4.
15. Kelly MJ. The encounter between HIV/AIDS and education. South Africa: UNESCO Sub-Regional Office for Southern Africa; 2000.
16. Kelly M. Preventing HIV transmission through education: HIV/AIDS and education. Perspectives in Education: HIV/AIDS and Education: Special issue 2. 2002;20: p.1-12.
17. Coombe C, Kelly MJ. Education as a vehicle for combating HIV/AIDS. Prospects 2001;31:435-45.
18. Piot P, Greener R, Russell S. Squaring the circle: AIDS, poverty, and human development. PLoS Med 2007;4:1571-5.
19. Hecht R, Stover J, Bollinger L, Muhib F, Case K, de Ferranti D. Financing of HIV/ AIDS programme scale-up in low-income and middle-income countries, 2009- 31. Lancet 2010;376:1254-60.

Ability of Managing Medical Emergencies in Dental Setting among the Interns and Faculty of a Dental College in Mangalore

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ABSTRACT

Aim: To explore the perceptions, concerns, and experiences of interns and staff after their accident and emergency posting in a dental institution.

Objective: To evaluate the knowledge and awareness of Medical emergencies among the interns and staff in a dental institution.

To comparatively evaluate the knowledge and awareness of Medical emergencies among the staff and interns of the institution.

Material and Method: A cross sectional questionnaire study was conducted in a DCI (Dental Council of India) recognized college. The data was collected using questionnaire method regarding the awareness and knowledge of medical emergencies among the interns and staff of a dental institution.

Data Collection: Questionnaires were introduced to the participants regarding the awareness and knowledge of medical emergencies after obtaining the informed consent. 155 questionnaires were distributed to the respondents of a dental college were included for this study.

Statistical Analysis: Descriptive statistics were tabulated. Chi-square tests were applied for this study.

Results: Only 53.2% among the staff respondents had attended a training program in BLS, whereas 86.6% of the interns had attended a training program in BLS. All the interns (100%) knew about the abbreviation of BLS. 96.8% of the staff aimed at the need of BLS training in the dental curriculum. 95.1% of the interns, and 88.7% of the staff were able to provide the right option on the signs of airway obstruction. 90.2% of the interns and 77.4% of the staff gave the right option of head tilt-chin lift maneuver to open the airway during obstruction.

Conclusion: Awareness of BLS among the staff and interns was not upto the mark, and hence it is now essential to make it mandatory in the field of dentistry for both undergraduate and postgraduate curricula.

Keywords: *BLS Awareness, Cardiac resuscitation, Dentist knowledge of BLS*

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INTRODUCTION

Medical emergencies in dental practices are the most common encounters, and so specialized skills are required in the management of these situations. Dental curriculum should conduct workshops and training

programs in basic life support. In India, the internship in medical and dental subjects is the final arena before graduation, and the interns are considered to be the future. Managing medical and emergencies boosts up the confidence level among upcoming graduates.[1] In case of cardiac emergencies, administering basic life support [BLS] is the most important contribution of the dentist until definitive treatment is achieved. Rapid changes in the demographics of the population, with the increase in longevity rate have led the people having medical conditions which predispose to a medical emergency or taking medication may influence their dental management and persons aged above 65 years.[2] Dentist and their staff acquire proper training in the management of emergencies to a level based on their clinical responsibilities. Skills learned should be refreshed on annual and regular basis, and training can be undertaken at specialized centers.[3] Basic Life Support (BLS) is a simple life-saving protocol following a cardiac arrest. It is an integral part of emergency resuscitative care that aims to retain sufficient ventilation and circulation until the cause of the arrest is detected and eliminated.[4] The present study assessed the knowledge and attributes towards the BLS and ACLS and other medical emergencies among the interns, post graduate students and faculty in a dental institution.

MATERIAL AND METHOD

Study design: A cross sectional study

Target Population: Participants were selected from a DCI (Dental Council of India) recognized dental college. Questionnaires was distributed to the respondents.

Data Collection: The participants were introduced with the questionnaire regarding the awareness and knowledge of medical emergencies among the interns and staff of a dental institution.

Sample Size: 155 questionnaires were distributed to the respondents of a dental college who were included for this study.

Inclusion criteria:

Interns and Staff of a dental college who consented to take part in the study.

Exclusion criteria:

Interns and staff of a dental college who did not consent to take part in the study.

Expected Study of Duration: Data collection was started after obtaining approval from the Institutional Ethics Committee center. Data collection was carried out till the sample size is reached.

Validity of the checklist: The checklist was validated before finalizing after obtaining approval from the IEC committee. Content validation of the questionnaire was carried out.

Study Location: The study was conducted among interns and staffs of a recognized dental college.

Data Collection: A cross-sectional study was conducted among interns and staffs of a dental colleges in Mangalore. Confidentiality pertaining to the information was obtained during the course of the study and was maintained at every stage of the study.

Data Management and Statistical Analysis: Descriptive statistics was tabulated. Chi square tests was applied.

Ethical considerations:

- Ethical clearance to conduct the study was obtained from the Institutional Ethics Committee of the dental college.
- Confidentiality pertaining to the information obtained during the course of the study was maintained at every stage of the study.

RESULTS

Only 53.2% among the staff respondents had attended a training program in BLS, whereas 86.6% of the interns had attended a training program in BLS (Table I). All the interns (100%) knew about the abbreviation of BLS, and 98.4% of the staff gave the correct abbreviation of BLS (Table II). 96.8% of the staff aimed at the need of BLS training in the dental curriculum (Table III). 95.1% of the interns, and 88.7% of the staff were able to provide the right option on the signs of airway obstruction (Table IV). 14.5% of the staff and 8.5% of the interns only were able to discuss the right sequence for BLS (Table V). Only 25% of the staff and interns were able to discuss the right answer on checking the pulse for not more than 5 seconds (Table VI). 90.2% of the interns and 77.4% of the staff gave the right option of head tilt-chin lift

maneuver to open the airway during obstruction .78% of the interns and 51.6% of the staff were able to give the correct opinion for the most appropriate rate of CPR for an adult.

TABLE I: Have you undergone training programme in BLS

		group		Total
		Staff	Interns	
Yes[a]	Count	33	71	104
	%	53.2%	86.6%	72.2%
No[a]	Count	29	11	40
	%	46.8%	13.4%	27.8%
Total	Count	62	82	144
	%	100.0%	100.0%	100.0%

a

TABLE II: What does BLS stand for

		group		Total
		Staff	Interns	
Basic life support	Count	61	82	143
	%	98.4%	100.0%	99.3%
Basic life services	Count	1	0	1
	%	1.6%	0.0%	0.7%
Total	Count	62	82	144
	%	100.0%	100.0%	100.0%

TABLE III: Do you think BLS training should be part of the compulsory dental curriculum?

		group		Total
		Staff	Interns	
Yes	Count	60	82	142
	%	96.8%	100.0%	98.6%
aw4				
No	Count	2	0	2
	%	3.2%	0.0%	1.4%
Total	Count	62	82	144
	%	100.0%	100.0%	100.0%

TABLE IV: Signs of airway obstruction include which of the following

		group		Total
		Staff	Interns	
Poor air exchange	Count	3	1	4
	%	4.8%	1.2%	2.8%
High-pitched noise while inhaling	Count	3	2	5
	%	4.8%	2.4%	3.5%
Inability to speak	Count	1	1	2
	%	1.6%	1.2%	1.4%
All of the above	Count	55	78	133
	%	88.7%	95.1%	92.4%
Total	Count	62	82	144
	%	100.0%	100.0%	100.0%

TABLE V: Which of the following sequences is correct for BLS

		group		Total
		Staff	Interns	
1.00	Count	26	32	58
	%	41.9%	39.0%	40.3%
2.00	Count	7	4	11
	%	11.3%	4.9%	7.6%
3.00	Count	9	7	16
	%	14.5%	8.5%	11.1%
4.00	Count	20	39	59
	%	32.3%	47.6%	41.0%
Total	Count	62	82	144
	%	100.0%	100.0%	100.0%

TABLE VI : Check for pulse for no more than

		group		Total
		Staff	Interns	
5 seconds	Count	14	21	35
	%	22.6%	25.6%	24.3%
10 seconds	Count	35	42	77
	%	56.5%	51.2%	53.5%
15 seconds	Count	13	19	32
	%	21.0%	23.2%	22.2%
Total	Count	62	82	144
	%	100.0%	100.0%	100.0%

DISCUSSION

In the present study, we found that the staff and interns of the dental college did not have appropriate BLS knowledge. The findings of this study are in accordance with previous studies which showed similar results and found that knowledge and awareness of BLS need to be updated [5,6,7].

Most of the participants in our study, staff and interns feel the need for improvisation of BLS knowledge and thus should be included in the undergraduate dental curriculum. According to Pillow et al., 98.2% of students believed that BLS should be made mandatory in the medical student curriculum[8].

In the results of the study done by Roshana et al., they found that almost 95% of the study participants opinioned the need of BLS training should be included in the undergraduate teaching programme [9]. A study done by Sharma et al. also support that all interns (100%) from medical and dental fields need the inclusion of BLS in their academic curriculum along with structured BLS training. This study is also in accordance with the study of Zaheer et al. which showed that 79% of participants gave the opinion that BLS should be a part of the undergraduate teaching programme [10,11].

In this study, one question (related to the abbreviation of BLS) was correctly answered by 98 % of the participants, These results are similar to those obtained by Roshana et al.[9], who found that one question (related to the abbreviation of CPR) was correctly answered by 96.7% of the participants, whereas the rest of the questions were correctly answered by less than 50% of the participants.

In a study conducted by Sharma and his co-workers, found that medical and dental interns had inadequate knowledge on BLS. In this present study, however, dental interns had average knowledge about BLS.

CONCLUSION

Awareness of BLS among the staff and interns was not satisfactory, and hence it is now essential to make it mandatory in the field of dentistry for both undergraduate and postgraduate curriculum. According to this study, a need for the hands on workshop should be made mandatory.

Ethical Clearance- Taken from Institutional Ethical committee, MCODS, Mangalore.

Source of Funding- Self

Conflict of Interest - Nil

REFERENCES

1. S. Elanchezhiyan, Sugumari Elavarasu, K. Vennila, R. Renukadevi, M. Nazargi Mahabob, B. Sentilkumar, S. Raja. Awareness of Dental Office Medical Emergencies Among Dental Interns in Southern India: An Analytical Study. Journal of Dental Education 2013; 77(3):364-369.
2. Praveen S. Jodalli , Anil V. Ankola. Evaluation of knowledge, experience and perceptions about medical emergencies amongst dental graduates (Interns) of Belgaum City, India. J Clin Exp Dent. 2012;4(1):e14-8.
3. K. Sneha Shenoy, H. N. Pallavi, K. Pushpanjali, Vaibhav Gupta. Perceptions, concerns, and experiences of dental interns after accident and emergency posting: A qualitative study. J Indian Assoc Public Health Dent 2016;14:332-7.
4. Ohoud Alotaibi, Faizah Alamri, Laila Almufleh, Wedad Alsougi. Basic life support: Knowledge and attitude among dental students and Staff in the College of Dentistry, King Saud University. The Saudi Journal for Dental Research 2016; 7, 51–56.
5. Shrestha Roshana, Batajoo KH, Piryani RM, Sharma MW. Basic life support: knowledge and attitude of medical/paramedical professionals. World J Emerg Med 2012;3(2):141–5
6. Chandrasekaran Shanta, Kumar Sathish, Bhat Shamim Ahamed, Saravanakumar P Mohammed, Shabbir P Mohammed, Chandrasekaran VP. Awareness of basic life support among medical, dental, nursing students and doctors. Indian J Anaesth 2010;54(2):121 6.
7. Sahithi Reddy, Dolar Doshi, Padma Reddy, Suhas Kulkarni, Srikanth Reddy. Awareness of basic life support among staff and students in a dental school. J Contemp Dent Pract 2013;14(3):511–7.]
8. Tyson Pillow Malford, Donald Stader, Matthew Nguyen, Dazhe McArthur, Robert McArthur, Shkelzen Hoxhaj. Perceptions of basic, advanced, and pediatric life support training in a United States medical school. J Emerg Med 2014;46(5):695–700.

9. Shrestha Roshana, Batajoo KH, Piryani RM, Sharma MW. Basic life support: knowledge and attitude of medical/paramedical professionals. World J Emerg Med 2012;3(2):141–5.
10. Sharma Raghava, Attar Nazir R. Adult basic life support (BLS) awareness and knowledge among medical and dental interns. NUJHS 2012;2(3):6–13.
11. Hassan Zaheer, Zeba Haque. Awareness about BLS (CPR) among medical students: status and requirements. J Pak Med Assoc 2009;59(1):57–9.
12. Sharma R, Attar NR. Adult basic life support (BLS) awareness and knowledge among medical and dental interns completing internship from Deemed University. NUJHS 2012; 2: 6–13.
13. Marsden AK. Guidelines for Cardiopulmonary Resuscitation Basic Life Support Revised recommendat ions of the Resuscitation Council (UK). BMJ 1989; 299: 442–445.

Study to Assess the Social and Economic Impact of Alcohol in A Peri-Urban Area of Tamil Nadu

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ABSTRACT

Introduction: Alcoholic beverages have been used in human societies since the beginning of recorded history**.** There is a exponential relationship between the amount of alcohol consumed and criminal behavior, including drunken driving and legal arrests. The cost associated with alcohol amount to more than 1% of gross national product in high income and middle-income countries, with the costs of social harm constituting a major proportion in addition to heath cost. **Methodology:** A community based cross sectional study was carried out using pretested questionnaire method to find out social and economic impact of alcohol in study population. Study population included all alcoholics aged between 18 and above who visited UHTC for other ailments & were willing to participate during the period and data analyses done with SPSS ver. 15.0. **Result:** Among 212 individuals, 37% alcoholics were involved in public commotion, rash driving, nearly 90% of them utilize their family income for alcohol consumption, 65% of them were in financial crisis and lost their job. On family income basis, the economic impact of excessive alcohol consumption is approximately 20-30 %.

Keywords: *Alcohol, Impact, Social, Economic, Urban, Tamil Nadu.*

INTRODUCTION

Alcoholic beverages have been used in human societies since the beginning of recorded history[1]. The patterns of alcohol intake around the world are constantly evolving and alcohol is ubiquitous today. Increase in the average volume of drinking are predicted for the most populous regions of the world in South-east Asia including India[1]. Cultural differences apparently influence the pattern of alcohol consumption[4]. In addition, alcohol is linked to categories of disease whose relative impact on the global burden is predicted to increase. The crucial need from a public health perspective, is for regular means of coordination whereby prevention of alcohol related problems is taken fully into account in policy decisions about alcohol control and regulation in market for alcoholic beverages.

Alcohol and tobacco are important products of global addictive demand and have experienced a rapid increase in per-capita consumption. The fastest growth has been in developing countries in the Asian subcontinent where the per capita pure alcohol consumption has been increased by over 50 % between 1980 and 2000[1]. Alcohol is casually related to more than 60 medical conditions. Overall, 3.5 % of global burden of disease is attributable to alcohol which accounts for as much death. Although the recorded alcohol per captia consumption has fallen since 1980 in most developed countries, it has risen steadily in developing countries so in India[1]. The per captia consumption of alcohol by adults more than 15 years in India is increased by 106.7% between 1970-72 and 1994-96[1].

The pattern of drinking alcohol in India has changed from occasional and ritualistic use to social use. Today, the common purpose of drinking alcohol is to get drunk. Financial constraints among patients suffering from excessive alcohol use may hamper the ability to obtain the routine healthcare and further delay the diagnosis of alcoholic liver disease[2]. Because of this, alcohol related problems are usually not detected until hepatic decompensation occurs. There is a exponential relationship between the amount of alcohol consumed and criminal behavior, including drunken driving and legal arrests[1].

Alcoholic beverages normally serve both the interest of public health and welfare, and simultaneously gain extra revenue for the government. Household expenditure studies in 1960s found families spending 3% - 45% of their income on alcohol[3]. Excessive alcohol consumption causes premature deaths (average of 79,000 deaths annually); increased disease and injury; property damage from fire and motor vehicle crashes; alcohol-related crime; and lost productivity[4]. The net effect of alcohol on health is detrimental, with estimated of 3.8% of all global deaths and 4.6% of global disability-adjusted life-years attributable to alcohol[5]. Disease burden is closely related to average volume of alcohol consumption, and, for every unit of exposure, is strongest in poor people and in those who are marginalized from the society. The cost associated with alcohol amount to more than 1% of gross national product in high income and middle-income countries, with the costs of social harm constituting a major proportion in addition to heath cost[5].

METHODOLOGY

A community based cross sectional study was carried out from March to August 2016 at Urban Health Centre Samayapuram, which is located in the Urban field practice area of CMCHRC, Trichy district in Tamil Nadu. The study was conducted after obtaining clearance from Institutional review board. Study population included all alcoholics aged between 18 and above who visited UHTC for other ailments & were willing to participate during the period. Interviews were anonymous and data remained confidential throughout the study. Each participant was informed about the purpose of the study and informed consent was obtained from each respondent. Data was collected using pre tested and semi structured questionnaire including, Alcohol Use DisorderIdentification Test (AUDIT)[6]. The questionnaire was developed based on the information gathered from literature. The questionnaire was first prepared in English and explained to the study population in Tamil. Data was collected by personal interview method. The data from the questionnaires were entered and analysed in SPSS 15.0 Trial version.

RESULTS

Table 1: Sociodemographic profile of study population

Variables	Categories	No. of Subjects	Percentage (%)
Age in yrs.	< 20	22	10.4
	21- 40	156	73.5
	41- 60	23	10.8
	>60	7	3.3
	Total	**212**	**100**
Gender	Male	201	94.8
	Female	11	5.2
	Total	**212**	**100**
SES (Modified BG Prasad Classification)	Upper	14	6.6
	Upper Middle Class	17	8.2
	Middle Class	25	11.7
	Lower Middle Class	54	25.4
	Lower Class	102	48.1
	Total	**212**	**100**
Education	Illiterate	98	46.2
	Completed School	67	31.6
	Graduate/ Diploma	30	14.1
	Masters	17	8
	Total	**212**	**100**

Majority of the study population were in the age group of 21 to 40 (73.5%) years and were males (94.8%). Nearly three quarters of the study population belonged to lower class (48.1%) and lower middle class (25.4%). About half of the study population were illiterates (46.2%) Table 1.

Table 2: Alcohol consumption pattern of study population

Variables	Categories	No. of Subjects	Percentage (%)
Type of Alcohol Beverage	Beer	34	16.0
	Brandy	103	48.5
	Rum	56	26.4
	Whiskey	17	8.0
	Others	2	0.9
	Total	**212**	**100**
Frequency of Alcohol Consumption	Occasionally	5	2.3
	Monthly	57	26.8
	Weekends	112	52.8
	Daily	38	17.9
	Total	**212**	**100**
Quantity of Alcohol consumed	<2 drinks (< 60 ml)	55	25.9
	3-4 drinks (90 - 120 ml)	108	50.9
	5-9 drinks (150 - 270 ml)	43	20.2
	>10 drinks (>300 ml)	6	2.8
	Total	**212**	**100**

It was observed that nearly half of the study population consumed Brandy (48.5%), followed by Rum (26.4%). Majority admitted to consume alcohol only during the weekends (52.8%). About 17.9% of study population admitted to daily consumption of alcohol. Nearly half of the study population consumed on an average of 3 -4 drinks (90 – 120 ml) per sitting Table 2.

Table 3: Social Impact of Alcohol consumption

Variables	Categories	No.of Subjects	Percentage (%)
Daily Routine activities affected due to alcohol consumption	Never	39	18.3
	Rarely	68	32.0
	Monthly	77	36.3
	Weekly	23	10.8
	Daily	5	2.3
	Total	**212**	**100**
Got Injured in drunken state	Never	132	62.2
	Within this year	31	14.6
	Previous year	49	23.1
	Total	**212**	**100**
Conflicts with family members	Never	56	26.4
	Occasionally	102	48.1
	Frequently	54	25.4
	Total	**212**	**100**
Fight in public places	Never	76	34.4
	Occasionally	110	51.8
	Frequently	26	12.2
	Total	**212**	**100**
Driving Two wheelers while Drunk	Never	103	48.5
	Occasionally	89	41.9
	Frequently	20	9.4
	Total	**212**	**100**
Fined for Drink and Drive	Yes	61	28.7
	No	151	71.3
	Total	**212**	**100**
Changed Job due to alcoholism	Yes	70	33.1
	No	142	66.9
	Total	**212**	**100**
Consume Alcohol during working hours	Never	145	68.3
	Occasionally	47	22.1
	Frequently	20	9.4
	Total	**212**	**100**

Only around 2.3% of the study population admitted that their daily routine activities were affected due to alcohol consumption. Nearly 38% of the population had an injury during drunken state. Nearly three forth of the study participant's family were concerned about the drinking problem. Around 25% of the participants had frequent conflicts with the family members due to drinking. About 12% of the study population gave

history of having frequent fights in public places. One third (33%) of the study population were involved in road traffic accident. Nearly 10% of the study subjects admitted to driving while they were drunk. About 28% of the subjects gave a history of being fined for drunken driving. One third of the study subjects had a job change because of alcohol consumption. About 10% of the study subjects admitted to alcohol consumption during working hours. (table 3)

Table 4: Economic Impact of Alcohol consumption

Variables	**Categories**	**No. of Subjects**	**Percentage (%)**
Source of expenditure for Alcohol	Own	26	12.3
	Family member	156	73.5
	Friends	30	14.2
	Total	212	100
% of Family Income spent for Alcohol	< 20	61	28.7
	20 – 30	79	37.2
	30 – 40	48	22.6
	40 – 50	16	7.5
	>50	8	3.7
	Total	212	100
Family financial problems	Yes	139	65.5
	No	73	34.5
	Total	212	100
Medical Expenses due to Alcoholism (% of Total Income)	< 20	4	1.8
	20 – 30	104	49.1
	30 – 40	93	43.8
	40 – 50	9	4.2
	>50	2	0.9
	Total	212	100
Amount spent on Alcohol per month in INR	Less than 1000	78	36.8
	1000 – 2000	115	54.2
	More than 2000	19	9.0
	Total	212	100

The predominant source of expenditure for buying alcohol was from family members (73.5%). Nearly 11% of the study subjects spent more than 40% of their total family income on alcohol consumption. Majority of the study population admitted to have financial problems due to alcoholism. Nearly 5% of the study subjects spent more than 40% of their income on meeting the medical expenses related to alcoholism. About 9% of the study population spent over 2000 INR per month on alcohol consumption.(Table 4)

DISCUSSION

Age and gender distribution of alcohol users in the present study is similar to study conducted by Sujit D Rathod in Madhya Pradesh[7]. With regard to literacy status the findings of the present study are in contrast to the study conducted by Sujit D Rathod, who found nearly 60% of their study population had less than 11 years of schooling, wheareas illiterates comprised of 28% compared to 46% in the present study.[7] with regards to socio-economic status in the present study nearly 74% belonged to low socio-economic class which is similar to findings of study conducted by Sujit D Rathod[7].

In the present study nearly 18% of study population admitted to daily consumption of alcohol, which is almost similar to the study conducted by A. pillai in Goa[8] who found that about 29% of the subjects gave history of heavy episodic drinking per month.

In the present study, nearly 66% of alcoholics were in financial crisis which comparatively decreased from 85% in previous study. Each alcoholic spend nearly 20-30% of their income for medical expenses due to alcohol consumption, on the other hand in our reference study nearly 50-65% income were spend by alcoholics for medical expenses[9]. In previous study, only nearly 25% alcoholics were indulged in causing self-harm or harm to others, rash driving and failed to do their routine, in our study nearly 37% were involved in causing self-harm and harm to others, specifically 36% were failed to do routine and indulged in rash driving[10].

In a study conducted by Prackash.C et.al, 32.8% of the study population consumed alcohol 6 days in a week on an average, in contrast in the present study more than half of the study population consumed alcohol during weekends[11]. A study conducted in eastern India found that average expenditure among ALD patients on alcohol was Rs. 3800/month, in contrast in the present study it was observed that around 9% of the population were spent > 2000 INR per month on alcohol[12]. Eleven % lost their job, and 7 % sold immovable property, in the present study it was observed that 33% of the study population admitted to frequent job change because of alcoholism. Besides, 52 % had disturbed social and family life, 34 % abused their spouse, 20 % suffered accidents, and 37 % indulged in physical violence in contrast the present study showed that 74% of them had conflicts with family members & 64% had fights in public places because of alcoholism. It was observed that 33% of the study population had met with accidents following alcohol consumption[12].

CONCLUSION

Predominance of low socio-economic classes and low literacy levels as found in the present study is a matter of concern. Disruption of social life because of alcohol as found in the present study is another important issue that needs further attention. Evidence – based strategies for reducing excessive drinking should be implemented. Health awareness programs have to be effectively implemented to decrease social burden of alcohol.

Conflict of Interest- None declared

Source of Funding - Self

REFERENCES

1 World Health Organization. The world health report 2002—Reducing risks, promoting Healthy life. Geneva:World Health Organization; 2002.

2 Room R, Babor T, Rehm J. Alcohol and public health. Lancet 2005; 365:519–30.

3 Murray CJ, Lopez AD. Global mortality, disability, and the contribution of risk factors: Global Burden of Disease Study. Lancet 1997; 349:1436–42.

4 Rehm J, Rehn N, Room R, Monteiro M, Gmel G, Jernigan D,et al. The global distribution of average volume of alcohol consumption and patterns of drinking. Eur Addict Res 2003; 9:147–56.

5 Rajendran SD (ed). Globalization and increasing trend of alcoholism. Community Health Cell, for the Asia Social Forum, 2–7 January 2003, Hyderabad, India.

6. Alcohol Use Disorders Identification Test (AUDIT) questionnaire downloaded from www.

talkingalcohol.com/files/pdfs/WHO_audit.pdf accessed on 8 Feb 2016.

7. Rathod SD, Nadkarni A, Bhana A, et al .Epidemiological features of alcohol use in rural India: a population-based cross sectional study. BMJ Open2015;5:e009802.doi:10.1136/bmjopen-2015-009802
8. Aravind Pillai, Madhabika B. Nayak ,Thomas K. Greenfield, Jason C. Bond, Abhijit Nadkarni,Vikram Patel. Patterns of alcohol use, their correlates, and impact in male drinkers: a population-based survey from Goa, India. Soc Psychiatry Psychiatr Epidemiol (2013) 48:275–282. DOI 10.1007/s00127-012-0538-1
9. Mohan D, Chopra A, Ray R, Sethi H. Alcohol consumption in India: A cross sectional study. In: Demers A, Room R, Bourgault C (eds). Surveys of drinking patterns and problems in seven developing countries. Geneva: World Health Organization; 2001:103–14.
10. Saxena S. Country profile on alcohol in India. In: Riley L, Marshall M (eds). Alcohol and public health in eight developing countries. Geneva: World Health Organization; 1999:37–60.
11. Prakash C. Gupta, Shekhar Saxena, Mangesh S. Pednekar, Pallab K. Maulik. Alcohol Consumption Among Middle-Aged And Elderly Men: A Community Study From Western India. Alcohol and Alcoholism, Volume 38, Issue 4, 1 July 2003, Pages 327 331,https://doi.org/10.1093/alcalc/agg077
12. Shivaram Prasad Singh, Pradeep Kumar Padhi, Jimmy Narayan, Ayaskanta Singh, Girish Kumar Pati, Preetam Nath et.,al. Socioeconomic impact of alcohol in patients with alcoholic liver disease in eastern India. Indian Journal of Gastroenterology, November 2016, Volume 35, Issue 6, pp 419–424

Analysis of Nuptiality Data through Life Table Approach

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ABSTRACT

Nuptiality has a strong association with socio demographic and economical change in society. So, it has immense importance to study the female age at marriage in society. In rural India, mostly marriages take place at early ages. In this study, gross nuptiality tables for female nuptiality of rural population of Uttar Pradesh, India have been constructed for the five consecutive decades 1951-61, 1961-71, 1971-81, 1981-91 and 1991-2001. It is observed that nuptiality rates are changing with time. Initially, the rate is small at the age group of 10 and increase rapidly till reaches to maximum at the age group 20. We also calculate expected number of years of single life remaining to a single person at age x. It is also observed that the age at marriage is increasing as the time passes.

Keywords: *Nuptiality Estimation, Cohort, Life Table*

INTRODUCTION

A complicated individual phenomenon like marriage, with very strong familiar and social interlocks can be studied from different angles and at different levels. Numerous studies have found that the process of union formation happens in a systematic way. The pattern of marriage is undergoing some discernible changes throughout the world. It has played a major role in determining the growth rate of population through its linkage to marital fertility.

Historically changes in the Nuptiality pattern has played very significant role with respect to demographic transitions in many of the European countries (Van de Wale, 1972)[1]. The experience of several less developed countries where population growth rate has recently slowed down also demonstrates this aspect (Das et al., 1998)[2].

The changes increases in respect of marriage age and age at consummation of the marriage and the resultant reduction in proportion of women remaining in married state are directly linked to fertility and thus determine the future trend of demographic transition. In India, major shifts have been observed in the age at marriage [3].

The age of female at the time of marriage is very important due to many reasons. These reasons depend on many factors such as social, economic, and demographic changes in population. This is probably one of the causes of the rise in nuptiality witnessed in certain countries; in other instances the increased mobility has mainly resulted in a considerable reduction of the number of consanguineous marriages [4].This work attempts to examine the scenario of marriage in Uttar Pradesh state of India. The aim of current work is to construct nuptality table for rural settings of Uttar Pradesh

Theoretical perspectives and previous findings

There are more adolescents in India today than ever before. According to the law and age at marriage for females in India by **(**Pathak, K.B. (1980) near the beginning of study period, 1992, India had 38 million adolescent women; by 2005, that number had grown by nearly half, to 50.5 million **(**Pathak, K.B. (1980**)** **[5]**). The three states with the largest female adolescent populations—Andhra Pradesh, Maharashtra and Uttar Pradesh—together account for one-third of all adolescent women in the country, with nearly 16% of the total living in Uttar Pradesh alone. Within most states, 15–19-year-old women now make up at least 10% of the state's population.5 An earlier start to a general decline in fertility is evident in the three low fertility states of Goa, Kerala and Tamil Nadu, as adolescent women account for a smaller proportion of the total state population in those three states (8–9%) than they do elsewhere (10–13%)[6].Young women's marital and reproductive behaviors are conditioned by where they

live, and most adolescents still live in rural areas. Fewer than three in 10 women aged 15–19 currently reside in urban areas. That proportion has increased, on average for the country as a whole, by an annual rate of about 1% (i.e., the percentage residing in urban areas rose from 25% in 1992 to 28% in 2005)[7]. However, the pace of urbanization has varied from state to state. It was most rapid in the northeastern state of Arunachal Pradesh, where the proportion of adolescent women residing in urban areas increased by 6% each year. As expected, urban adolescent women are generally better off economically than their rural counterparts: Only 27% of the former group live in households in the lowest three wealth quintiles, compared with 79% of the latter group. As of 2006(Report on Population projection, Government of India, 2006)[7], 28% of all 15–19-year-old women were members of scheduled tribes or castes, groups that have historically been socioeconomically disadvantaged; the proportion was higher in rural areas than in urban areas (31% vs. 22%). Currently, fewer than half of adolescent women in Bihar and Jharkhand in the East, and in Rajasthan in the North, have been to school for at least six years. On the other end of the spectrum, Goa in the West, Himachal Pradesh in the North and Kerala in the South had already virtually met the primary school completion goal for 2015 as of 2006, with 92–98% of 15–19-year-old women receiving this much schooling. Although till date, marriage is universal in the Indian context, there are certain shifts observed in the age at marriage, i.e., a consistent increasing trend in respect of mean and median age at marriage over cohorts born since 1916 for males and since 1921 for females[8].

In Uttar Pradesh, marriage age increased by 1year during 1901-1951 and by 1 year per decade thereafter. 33% of females aged 10-14 years were married in 1971, but under 1% were married at this early age in 1992-1993. A similar sharp decline occurred among females aged 15-19 years; by 1992-1993 only 40% were married at this early age. The difference in ages between men and women has remained at around 4 years [9]. Uttar Pradesh being the most populous and having almost lowest level of the mean age at marriage in the country received increasing attention to know what is happening to the age at marriage especially among females at the individual level. So there is need to have a detailed picture of the age patterns of marriage in these states. Women in Uttar Pradesh tend to marry at an early age **(Singh S & Samara R (1996)[10]**.32% of women age 15-19 are already married, and an additional 8% that they were married but "**gauna"** has yet to be performed.

DATA AND METHODOLOGY

Study area: The study is conducted in the area of Rural Health Training Centre(RHTC), Department of Community Medicine, Rama University, Kanpur.

Study participants: Study subjects are local residents of selected the village from RHTC area in Kanpur.

Inclusion criteria for subjects: Women, who were ever married and born in between 1931 to 2001, be included in the study.

Exclusion criteria for subjects: The following category of women be excluded from study-

- Who are unmarried.
- Born before 1931 and after 2001.
- Who are unable to give their history because of mental illness, physical disability.
- Who were not signing the informed consent.

Ethical approval:

The study has been approved by the Ethics Committees of Rama University, Kanpur. Informed consent in the local language will be taken from subjects during filling designed questionnaire, in written.

Questionnaire and tools for measurement:

Subjects be interviewed with the help of pre-designed and pre tested schedule to elicit the information pertaining to socio-demographic characteristics such as religion, caste, type and size of family, educational level, age atconsummation of the marriage, age at first pregnancy etc.

Sampling technique, Data Collection & Analysis method:

A cross sectional study design is adopted for this study in a community area. In the first stage 30 clusters will be selected from 25 villages of Kanpur District, where cluster defines a village whose population is more than 2500. In each cluster we divide all eligible population into seven birth cohort and in each cohort we do complete enumeration by conducting house to

house survey using designed questionnaire. The birth cohorts will be taken from1930 to 2000 with decade difference. Data is analyzed by using $R_{3.1.1}$ package & SPSS 21.0 Version software.Following method is used for nuptiality estimation:

Nuptiality Table method:

In this method, the basic data for the calculation of nuptiality rates will be the proportions in the decade synthetic birth cohorts 1931-1940, 1941-1950, 1951-1960, 1961-1970, 1971-1980, 1981-1990 and 1991-2000. The decade synthetic cohort for a particular decade will a hypothetical cohort subjected to the average marriage experience of the decade in question. The method followed for the estimation of nuptiality rates for a decade will be adopted from that of **Mertens (1965) [19].** Then retrospectively trace all cohorts of single persons over time from the youngest age at which marriage may occur. We assume the incidence of mortality to be the same for the single as for the total population and the single population to be depleted by two modes of decrement, namely, marriage and death. The following symbols will be used:

x: Age at years;

$_5n_x$: Five-year nuptiality rate for a single life at age x;

l_x: Number single at age x

$_5L_x$: Number of years lived as never married in the year of age (x, x+5)

T_x: Number of years lived as never married above age x

$e_x^{0:}$ Expected number of years of single life remaining to a single person at age x

RESULT & DISCUSSION

The gross nuptiality tables for female nuptiality of rural population of Uttar Pradesh, India for the periods 1951-61, 1961-71,1971-81,1981-91 and 1991-01 have been constructed in the table 1-5 respectively.

Table 1: Gross Nuptiality Tables for Female Nuptiality of Rural Population of Uttar Pradesh, India for the Period 1951-1961

x	$_5n_x$	L_x	$_5L_x$	T_x	e_x^0
0	---	133	665	2640	20
5	---	133	665	1975	15
10	0.0677	133	643	1310	10
15	0.4435	124	483	668	5
20	0.9275	69	185	185	3
25	---	5	--	0	0

Table 2: Gross Nuptiality Tables for Female Nuptiality of Rural Population of Uttar Pradesh, India for the Period 1961-1971

x	$_5n_x$	L_x	$_5L_x$	T_x	e_x^0
0	---	335	1675	6738	20
5	---	335	1675	5063	15
10	0.0299	335	1650	3388	10
15	0.4492	325	1260	1738	5
20	0.9330	179	478	478	3
25	---	12	---	0	0

Table 3: Gross Nuptiality Tables for Female Nuptiality of Rural Population of Uttar Pradesh, India for the Period 1971-1981

x	$_5n_x$	L_x	$_5L_x$	T_x	e_x^0
0	---	547	2735	11603	21
5	---	547	2733	8868	16
10	0.0128	546	2713	6135	11
15	0.2690	539	2333	3423	6
20	0.8934	394	1090	1090	3
25	---	42	---	0	0

Table 4: Gross Nuptiality Tables for Female Nuptiality of Rural Population of Uttar Pradesh, India for the Period 1981-1991

x	$_5n_x$	L_x	$_5L_x$	T_x	e_x^0
0	---	278	1390	6023	22
5	---	278	1385	4633	17
10	0.0036	276	1378	3248	12
15	0.1418	275	1278	1870	7
20	0.9958	236	593	593	3
25	---	1	---	0	0

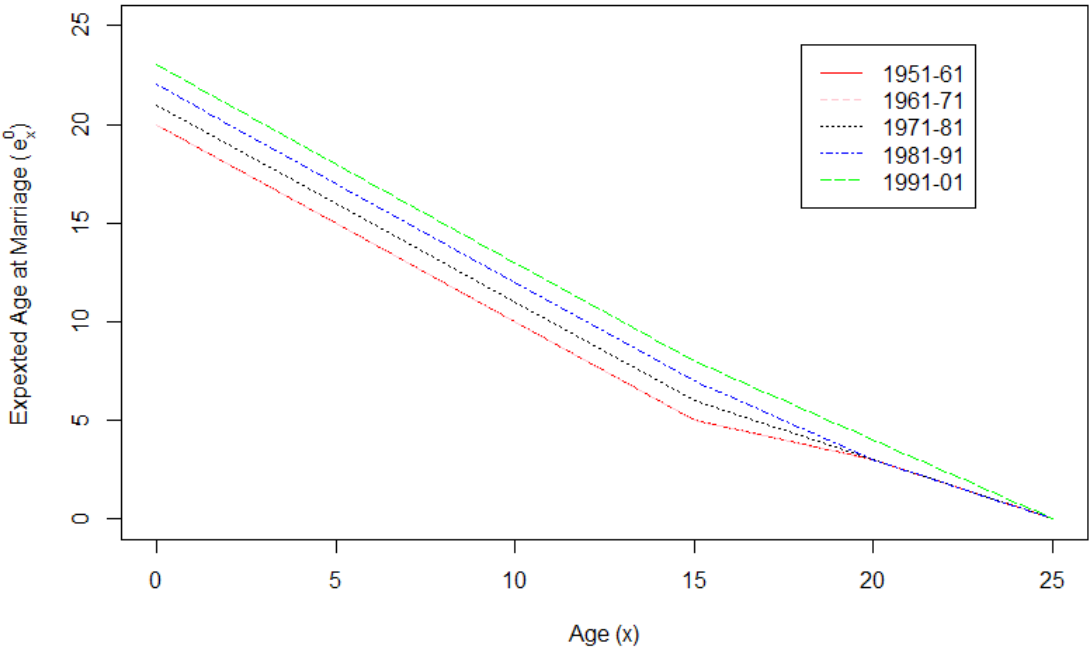
Table 5: Gross Nuptiality Tables for Female Nuptiality of Rural Population of Uttar Pradesh, India for the Period 1991-2001

x	$_5n_x$	L_x	$_5L_x$	T_x	e_x^0	x
0	---	465	2320	10523	23	0
5	---	463	2308	8203	18	5
10	0.0348	460	2260	5895	13	10
15	0.0766	444	2135	3635	8	15
20	0.5366	410	1500	1500	4	20

First of all, it is observed that nuptiality rates for females are changing with time. However, no particular trend is observed for nuptiality rate for all the periods considered in the study. The rates decline in the period 1961-71 for all the age group with respect to the period 1951-61 and similar trend is observed for all the considered period. Initially, the rate is small at the age group of 10 and increase rapidly till reaches to maximum at the age group 20.

The expected number of years of single life remaining to a single person at age x is same for both the periods 1951-61 and 1961-71. Although, expected number of years increase for further periods that indicates that as time passes the age at marriage increases slowly but still it is more or less same at the age of 20 and 25. We have also attempted to show the trend through figure and from figure 1, we can clearly see that expected number of single life to a single person at age x is low for the period 1951-61 and high for the period 1991-01 i.e. clearly indicating that the age at marriage is increasing as the time passes.

Figure 1: Expected Age at Marriage for Various Periods



Rural areas lagged behind urban areas in the shift to a later marriage age. The median age at first marriage among illiterate females in the aged 25-29 years was 14.4 years, and it was 20.4 years among females with a high school degree. In rural areas of Uttar Pradesh, marriage age varied by region. In rural areas, almost half of women age 15-19 have already married. Older women are more likely than younger women to have married at an early age; 57 percent of women who are now age 45-49 married before they were 15, compared with 20 percent of women age 15-19.

Although this indicates that the proportion of women who marry young is declining rapidly, 62 percent of young women age 20-24 in Uttar Pradesh still marry before reaching the legal minimum age of 18 years. On average, women are more than four years younger than the men they marry.There were lots of studies related to fertility and mortality but very little, to nuptiality. One reason for this might be that striking changes have occurred in the past in fertility and mortality with little change in marriage. In India there is a trend of early marriage. The states like Madhya Pradesh, Bihar, Rajasthan and Uttar Pradesh have substantially lower age at marriage (NFHS-III). So there was need to have a detailed picture of the age patterns of marriage in these states.

The female marriage pattern exhibits wider variations from state to state in India with regard to magnitude and direction. But from the following table it was observed that in rural Uttar Pradesh highest frequency occurs in 10 - 15 age group.

CONCLUSION

Uttar Pradesh being the most populous and having almost lowest level of the mean age at marriage in the country received increasing attention to know what is happening to the age at marriage especially among females at the individual level. So, it has immense important for analyzing the marriage habits of a population, a systematic construction and analysis of nuptiality tables for the Indian population has not been attempted so far. In the field of marriage for the Indian population, it is proposed that construction and analysis of nuptiality tables over different periods would constitute a definite advancement in the study of Indian nuptiality. A comparative study of nuptiality tables over different periods may help us to determine the extent to which marriage rates with probabilities of marrying and the changing pattern of mean ages at marriage. In view of the above, this study examines nuptiality status in rural U.P., with particular reference to changes in marriage age over time.

Conflict of Interest: NIL

Source of Funding: Self

REFERENCES

1. Effects of late marriage Read from URL: www.womanpla.com
2. Das Gupta S et al., Knot ready: lessons from programs and policies to delay marriage for girls in India, paper presented at International Seminar on Changing Transitions to Marriage: Gender Implications for the Next Generation in Developing Countries, New Delhi, 10(6), 2008.
3. Das, N P and DevamoniDey (1998). Female Age at Marriage in India: Trends and Determinants. Demography India, 27(6):91-115.
4. Effects of early marriage Read from URL: www.womanpla.com
5. Pathak, K.B. (1980): Law and Age at Marriage for Females in India. The Journal of Social Work, 49 (7): 407-416.
6. Sureender, S. (1992): Correlates of female age at marriage and an overview of legislation, marriage practices in Pondicherry. Unpublished Ph.D. thesis, IIPS Mumbai.
7. Government of India, Population Projections for India and States 2001-2026, Report of the Technical Group on Population Projections Constituted by the National Commission Population, New Delhi: Government of India, 2006(8).
8. Goyal, RP (1988). Marriage Age in India. Delhi: B R Publishing House.
9. Pandey Ajay; Pandey Arvind: Analyzing Female Nuptiality Pattern at Micro Level: A Case of Uttar Pradesh. IASSI Quarterly. 1997. 16 (3&4).
10. Singh S & Samara R (1996) Early Marriage among women in developing countries. International Family perspectives 22(8-9): 148-157, 175.
11. Bloom, D (1982). What's happening to the age at first birth in the United States? A study of recent cohorts. Demography 19(11,14):351–70.
12. Coale, A(1971) Age patterns of marriage. Population Studies 25(11,16):193–214.
13. Coale AJ and McNeil DR(1972)The distribution by age of the frequency of first marriage in a female cohort. Journal of the American Statistical Association 67(11, 14-15):743–49.
14. Hobcraft, J and TrussellJ. (1980) A note on the Analysis of Maternity Histories by Birth Order. WFS/TECH 1305. London: World Fertility Survey(11,14).
15. Kaneko, R (2003) Elaboration of the Coale-McNeil nuptiality model as the generalized log gamma distribution: A new identity and empirical enhancements. Demographic Research 9(11, 15, 17):224–62.
16. Liang, Z(2000)TheCoale-McNeil Model: Theory, Generalisation and Application. Thela Thesis,Amsterdam, The Netherlands.
17. Bongaarts, J and Feeney G. (1998)On the quantum and tempo of fertility. Population and Development Review (17):271–92.
18. Kohler, HP and Philipov D (2001) Variance effects in the Bongaarts-Feeney formula. Demography,38(17):1–16.
19. Mertens, Walter(1965)Methodological Aspects of the Construction of Nuptiality Tables.Demography 2:317-348.
20. Agarwala, S N (1962). Age at Marriage in India. Allahabad: KitabMahal.(1972). India's Population Problems. Bombay: Tata McGraw -Hill.

Economics of Sustainbility – A Theoritical Perspective

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ABSTRACT

Success of the human life relies on the sustainability of people's standard of living. Defining the term sustainability is a difficult task as it is complex in nature. This study is an attempt to project, new hypotheses to the term sustainability, by using natural and warranted growth rates. The unique concept of this research is to introduce a new concept called 'SNS Measurement' for Sustainability. This study also throws light on the link between the present and future generation in terms of sustainability in natural resources. Production is meaningful only when consumption is made and consumption without production leads to scarcity. Therefore the present theory initiates the concept of sustainability which involves in three aspects, firstly, the problems of distribution equity between inter and intra generations, secondly linkage of productions and production efficiency and finally, replacement of natural and artificial resources.

***Keywords**: Sustainability, Natural resources, SNS Measurement, Environment, Future.*

INTRODUCTION

The concept of sustainability of sustainable growth is very complex, subjective and an abstract. Common men do not know what it may mean and what its implications might be. UNESCO document states that every generation should leave water, air and soil and other natural resources as pure and unpolluted to the future generation. It precisely states that each generation should leave un- diminished flora and fauna to the younger generation. Does it mean that present generation should not construct buildings, road and dams? Is it our moral obligation to preserve our flora and fauna to the future? It is our sacrifice to the future generation. Is it compulsory to share the environment with the future? In fact it is an obligation to conduct ourselves in such a way to leave the undamaged environment to the future. It implies that we should not satisfy ourselves by impoverishing our successor. But we do not know the present optimum consumption that preserves an unpolluted environment to the future. Another point which relevant to this is that, we do not know the type of technology and consumption pattern and requirement of the future generation. No idea about the taste and preference of future generation. One thing, however, we must realize that we should not live at the expense of future well-being. Sustainability is a problem because each of us knows that we profit at the expense of the future[5]. In fact, we have free ride on each other and we have free ride on the future. Environment is the base for our survival but it should not become the matter of survival for the future. It is like a legacy, one should preserve the future.

ISSUES IN SUSTAINBILITY

Sustainability is a matter of distributional equity between the present and the future. It is about sharing of well-being between present generation and future generation. It is a matter of promoting our welfare without affecting the well-being of the future generation. Sustainable development is a point at which the needs of the present generation are fulfilled without compromising the ability of future generation to meet their own needs[6]. Achievement of sustainability is equity between both within the generation and across the generation, i.e. intergenerational equity and intra generational equity. It is the optimum utilization of natural resources in the present and future. It is a matter of equity rather than efficiency according to Howarth and Norgaard.[3]

People, by and large, put more emphasis on equity between generation, rather than equity across a given generation, it does not mean that latter is not important. The World Commission on the Environment and Development (The Brundtland report) in 1987 stated that both intergenerational equity and intra generational

equity are important. Those who talk and raise the issue of sharing river and ground water, forget the share, they must leave to the future generation. Now, the intergeneration environmental disputes are in the limelight. However sustainability demands more attention on the equitable shares between the generations.

When we use up some resources which are replaceable whether it is mineral, animal or any other environmental amenity, then we should provide replacement for equal value. The substitute that we provide in exchange could be knowledge, could be green technology etc. If there is no replacement there will be environmental degradation. Therefore the environment needs public policy, because each of us knows the repercussion of environmental degradation and it is burning issue today.

The solutions require for the estimation of natural and manmade capital requirement for both present future generation. It is in postponement of current consumption to the future generation. The issue of sustainability may be more appropriate to the developed countries. Because they have reached the stage of high mass consumption and further exploitation is not necessary. Whereas in the case of developing countries, the basic needs are yet to be fulfilled. Therefore the present generation in the UDC can go further and employ the resource to overcome poverty and vast income inequality without damaging the environment. The paradox arises because if we concern about people who are currently poor, that will translate into an increase in current consumption not into an increase in investment. Therefore thinking about poor people today will be disadvantageous from the point of view sustainability.

It is a serious problem even in UDCs if the technology of the production process is not nature friendly. Here comes the importance of efficiency of production function and nature and pattern of consumption. However, natural capital can be exploited by man, but cannot be created by man. According to thermodynamic school, natural capital and manmade capital are in most of the cases complements rather than substitutes[2]. They stated further that natural capital such as land, animals, aquatics, non-renewable and renewable energy and mineral stock are primary inputs and manmade capital and labourers are the agents of transformation. Sustainability intended are very high within the group and it is very low between the groups. Sustainability as a matter of distributional equity between the present and the future; it becomes the issue of saving and investment. It is the choice between current consumption and future consumption. Then one has to find out the technology which reduces the wastage in the production process. Hence, the concept of sustainability involves the problems of distribution equity between inter and intra generations and productions and production efficiency and replacement of natural and artificial resources.

MEASURES OF SUSTAINBILITY

According to Hartwick-Solow, so long as the stock of capital did not decline overtime, non-declining consumption was possible. The stock of capital could be held constant by reinvesting from all non-renewable resources. Extraction in man-made capital, is built up for replacement. Man and natural capital are assumed to be perfect substitute under their model.

PEARCE-ATKINSON MEASURE OF SUSTAINABILITY

They have proposed an indicator of weak sustainability criterion viz., PAM. To them,

$$\mathbf{PAM} = a - C_m/Y - C_n/Y$$

Where

a is Marginal Propensity to Save, C_m = Manmade capital and C_n = natural capital

The economy is sustainable if PAM > 0. The equation states that PAM will be positive if MPS exceeds the sum of depreciation on manmade and natural capital. According to David pearce[1] and Giles D Atkinson(1993), sustaibability estimation to countries like Czechoslovakia, Germany, Hungary, Japan, Netherland, Poland and the USA passed the weak test (PAM>0). Mexico and the Philippines are classed as "Marginal" (PAM=0) while Ethipia, Indonesia, Madagascar, Malawi and Nigeria are unsustainable (PAM<0). Recently, Atkinson and Proops (1998) adopted the PAM measures to include imports and exports.

'SNS MEASUREMENT' OF SUSTAINABILITY

God has erected the universe and the environment. Natural capital such as land, water, atmosphere and minerals are gifts of nature. God has created nature along with the man kind. Man has to produce, the basic needs for his comfort. God has created land but man has to employ land to produce food grain cloth and

shelter. In the process of exploration and employment of natural resources, man has to be careful to leave the undamaged environment to the future generation. Optimum utilization of natural resources may leave due share to the future. Full employment equilibrium income of the economy indicates optimum utilization of natural resources. We cannot suffer today without employing the available resources for the sake of future generation. We cannot starve today for the sake of tomorrow's prosperity.

At the same time we cannot use the environmental resources by damaging it or going beyond her capacity. No one can go beyond the nature or conquer the nature. When we reach the peak there comes the down fall. That is life cycle and it is unavoidable law of life. Any economy is subjected to fluctuation. Therefore equality between demand and supply, saving and investment would indicated the economics of sustainability.

The economics of sustainability exist when $G=G_n=G_w$. That is the Actual growth rate = natural growth rate = Warranted growth rate. At this point the present societies fulfil its needs and reach the optimum point. Beyond this point there would not be sustainability. The points of equality between S and I is the optimum but unstable. That is S=I, the starting point of un- sustainability. Therefore investment must be less that saving. Sustainability is very high if S=K. If it becomes S=k or S=I, it is the point of sustainability. This can be explained with the following equation. For sustainability according to

PAM = $S/Y - Km/Y - Kn/Y > 0 - 1$.

Let $Km/Y + Kn/Y = K/Y$ and rewrite equation 1

As $S/Y - K/Y > 0$ -2 (or)

$S/Y > K/Y$ -3

$S > K$ -4

Equation 4 indicates high level of sustainability. If S=K then it is fairly sustainable. If we give incremental value to equation one, Then it can be rewritten as follows.

$\Delta S/\Delta Y - \Delta K/\Delta Y > 0$ 5 - or

$\Delta S/\Delta Y > \Delta K/\Delta Y$ 6 - or

$\Delta S > \Delta K$ 7 - or

For high level of sustainability, the growth rate of saving must be be greater than the growth rate of capital. But the equality between the growth rate of income and growth rate of capital can explain both economy's equilibrium and sustainability.

Let $S/Y + C/Y = 1$ that is APS + APC = 1

Let $Kn/Y + Km/Y = 1$ that is share of both natural and manmade capital in the total national income. Let $S/Y + C/Y = Kn/Y + Km/Y$ [$Kn/Y+Km/Y=K/Y$][8] That is $S+C = K$

By giving incremental value the above equation can be written as follows.

$\Delta S + \Delta C$

At equilibrium point,

$\Delta Y = \Delta S + \Delta C$, Since $\Delta K = \Delta S + \Delta C = \Delta Y$, hence $\Delta K = \Delta Y$ or $I = \Delta Y$

Therefore, for sustainability the growth rate of capital must be equal to the growth rate of income which satisfy the economic equilibrium too. What the researcher concludes is that the economic equilibrium itself indicates the sustainability of the economy. This also can be explained graphically.

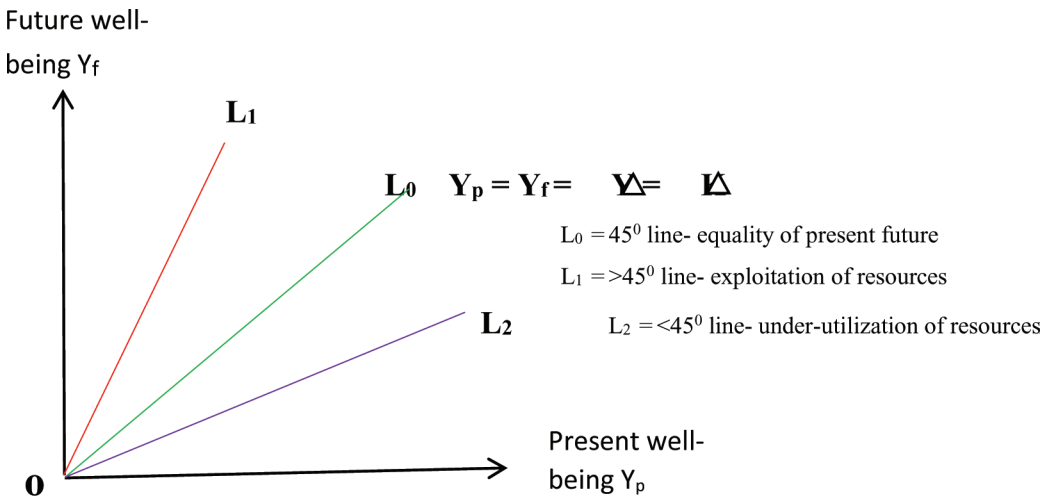

Figure 1. SNS Measurement

In figure 1, the present well-being is presented in the X axis and future well-being in the Y axis. OL straight line explains the equality between present and future generation. OL straight line (or) production function OL satisfies the sustainability norms. On the other hand, OL_1 production function indicates over exploitation of natural resources and un- sustainability. Similarly, OL_2, production function explains the under-utilisation of natural resources by the present generation.

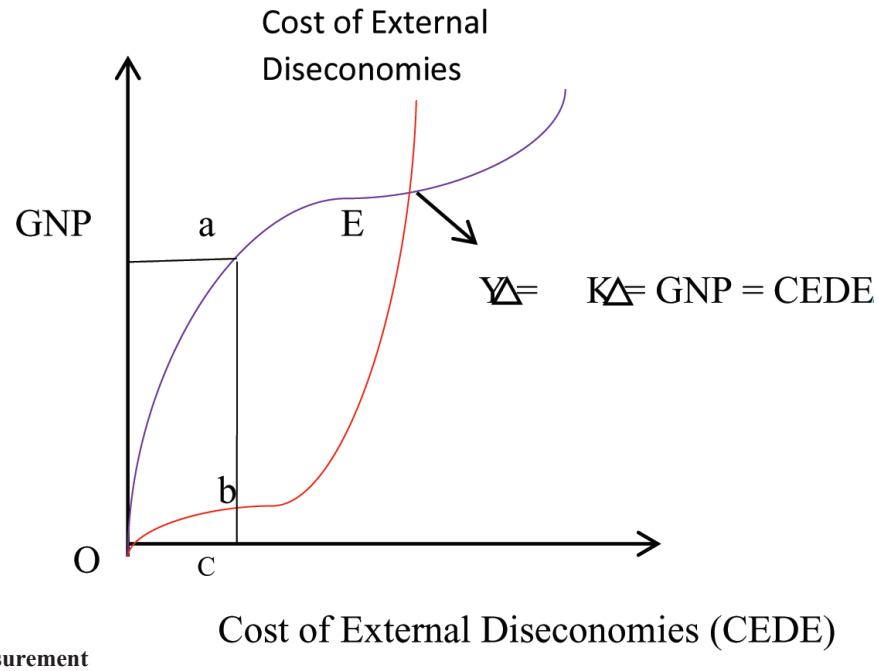

Figure 2. SNS Measurement

In figure 2, at point 'E' the rate of growth of income is equal to rate of growth of capital. After point 'E' there is no possibility for sustainable development. After this point the present generation ride on the future generation. At point 'a' GNP is greater than the cost of external diseconomies. That is ab > bc. Therefore the net economic welfare (ac – bc > 0) is positive enough to leave due share to the future. At the same time people in the present may live happily without suffering from external diseconomies such as air pollution, noise pollution, water pollution, etc.

CONCLUSION

The term sustainability is more abstract and subjective. Measurement of sustainability is possible if we able to estimate the value of manmade capital and natural capital. We also need the estimation of capital requirement for the present and future generation. But the measurement of capital requirement for the future as well as the present generation depends up on the level of technology of the present and future generation. Further, the capital requirement of the future, level of technology of the future and the total population in the future cannot be estimated. However, the PAM measurement indicates that the economics of sustainability is possible in a point where MPS is greater that the capital output ratio. The SNS measurement of sustainability indicates that the sustainability is possible where growth rate of income is equal to the growth rate of capital. This is also possible to estimate if we able to estimate the cost of external diseconomies. As long as the cost of external diseconomies is less than the total income of the country, the sustainable development is possible.

In conclusion, it is to state that sustainability is not necessarily viewed as the matter of distribution between the present and future but it must be viewed as a matter of survival of the present[4]. Over exploitation, wastage of non-renewable resources and man's invasion against the nature will create unfavourable environment to the present generation. Man's attempt to conquer the nature is like one who is digging his own pit, because, man cannot conquer the nature. Man cannot understand the nature. One should understand that the deviation from the nature is deviation from happiness. Therefore we can only follow the law of nature. Let us see how the present generation can be protected from the environmental

degradation. How to stop the damage or stein we put on the environment. The act of protecting the present generation from the external dis economics will automatically help the future generation. Let us hope for the eco-friendly production function and consumption pattern. Let we conclude that the real and peaceful life can be lived just by following the nature not by understanding and conquering the nature.

Ethical Clearance: Completed. (Dept. level committee at VELS)

Source of Funding: Self

Conflict of Interest: NIL

REFERENCE

1. David W.Pearce and R.Kerry, Turner, Economics of Natural Resources and the Environmental, Harvester Wheatsheaf, New York, 1999.
2. Jari kaivo-oja , Analysis of Historical and future problems of Sustainable development, Academic dissertation, University of tempere, Finland, 2004
3. Nick Hanley, J.F.Shogren and Benwhite, Environmental Economics in theory and practice, Macmillan India Ltd., 1997.
4. S.N.Sukumar, Myth and Realities of Sustainability in the UGC National Level Seminar held in Gobi Arts College, Gobi, 2004.
5. Andre,Rae, 'Organizational Responsiveness to the sustainability paradigm ; A Comparison of Government Departments – Government sponsored Enterprises and private firms', International journal of Business and Transformation, 3(3), 8-15, 2011
6. Anna Heikkinen,"Discursive construction of climate change engagement in Business organization" dissertation, University of Tampere,2014, http://tampub.uti.fi
7. Li,Hong E, Xiao Xu Dong, et.al, 'A New Method and Applications of the Boudary value Problem of Differential Equation' Advanced Materials Research, 2014.

Factors Affecting Neonatal Mortality and Morbidity - An Epidemiological Study

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ABSTRACTS

Background: Neonatal period is very much vulnerable to different problems leading to death. Neonatal morbidities are burden to the health system and claim the neonatal life. Sample registration system (SRS) statistical report 2013 says Odisha have very high NMRs around 35 or more per 1000 live births. This study aims at finding out the epidemiological causes affecting the neonatal morbidities and mortality.

Material and method: This is a retrospective observational study. Tenure of the study is one year from January 2014 to December 2014.

Result: Total number of 304 cases was observed. Percentage of deliveries requiring NICU admission-18.78%. Majority of cases admitted (58.8%) cases were within 24 hours of delivery. Out of which 61.8% cases were male.51.3% cases were delivered by NVD. Highest number of mothers was within 25-30 years of age and was multipara. Neonatal jaundice and prematurity are the two important cause of morbidity (49.3%, 32.8% respectively).death rate was 2.96% while number of cases improved was 93.7%.3.2 % cases had left the hospital against medical advice.

Conclusion: The neonatal morbidity and mortality is a reflection of the socio economical background of the mother. A holistic approach from proper antenatal care to delivery and a proper neonatal care can reduce not only the mortality but also the morbidities of the neonate.

Keywords: *Low birth weight, Prematurity, NICU, Birth asphyxia, meconium aspiration*

INTRODUCTION

Neonatal period is very much vulnerable to different problems leading to death. In developing countries 96% of the world's, approximate 5 million annual neonatal deaths occur. [1] India contributes to one-fifth of global live births and more than a quarter of neonatal deaths. Nearly, 0.75 million neonates died in India in 2013, the highest for any country in the world. [2] Sample registration system (SRS) statistical report 2013 shows neonatal mortality rate(NMR) to be 28 per 1000 live births.[3] In year 2000 the NMR was 44 per 1000 live births while it has declined to 28 per 1000 live births in 2013.But this rate of decline is less compared to rate of decline of infant mortality rate. The Millennium Development Goal-4(MDG 4) by year 2015 could not be achieved due to this slow decline in NMR. Neonatal morbidities are burden to the health system and claim the neonatal life. Bang *et al* (1995–1996) has studied a detail burden of common morbidities in rural community settings.[4] According to Global, regional, and national causes of child mortality in 2000–13, with projections to inform post-2015 priorities: an updated systematic analysis. Lancet 2015, preterm birth complications and infections are the two major causes of neonatal deaths in

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India.[5] Studies on the timing of neonatal deaths indicate that about three-fourths of total neonatal deaths occur in the first week of life. [6, 7, 8]

According to High-Level Expert Group appointed by the Planning Commission of India, in a scenario of the health inequality and social inequality, the poorest and most disadvantaged have a higher risk for disease [9] Sample registration system (SRS) statistical report 2013 says Kerala and Tamil Nadu have low NMRs (<20 per 1000 live births) whereas Odisha, Madhya Pradesh and Uttar Pradesh have very high NMRs (35 or more per 1000 live births). The NMR in rural areas is 31 while that is 15 per 1000 live birth in urban areas. The discrepancy is more marked in Andhra Pradesh, Assam, Jharkhand and Kerala.[3] There is no definite sex- differentiated NMR statistics available but studies shows females neonates are deprived of proper health care compared to male one. [10,11] Maternal age and education has got direct influence on the neonatal mortality and morbidity .This is well evidenced by NMR statistics of Kerala. In India, 30% 0f neonates are borne with low birth weight[12] and more than 80% of total neonatal deaths occur among LBW/ preterm neonates.[13] Both neonatal sepsis and perinatal asphyxia contributes a huge towards NMR.[14] The interventions in antenatal , during delivery and postnatal period influence a lot for prevention of neonatal mortality. UNICEF coverage evaluation survey in 2009 (CES 2009) shows only a quarter of pregnant ladies had full antenatal checkup,73% of pregnant ladies had institutional deliveries and only one third of neonates were breastfed within 1hr of birth.[15]

Our study aims at deriving the factors affecting the neonatal morbidity and mortality in Orissa which is having high NMR.

METHODOLOGY

This retrospective observational study was conducted in the department of paediatrics, IMS and SUM hospital which is a teaching hospital in Orissa, India for a period of one year (Jan 2014 to Dec 2014). This is a teaching hospital having neonatal ICU (NICU) facility. This NICU is having 15 no of beds and only the neonates who are delivered in the same hospital are admitted here. All the NICU admissions strictly follow the admission criteria of the NICU protocol.This NICU has phototherapy unit ,radiant warmer, high frequency ventilator, bubble continuous positive airway pressure, ultrasonography having neonatal echocardiography, neuro sonogram facility, exchange transfusion facility. Radiological investigation facility like CT scan and MRI are also available in the hospital. The unit lack of the facility of inhale nitric oxide.

After Ethical clearance and due consent from the parents, in our study we have taken all the neonates admitted to the NICU during the period January 2014 to December 2014. The neonates who had undergone any surgery and all the referred cases and all the neonates who had left against medical advice were excluded from the study. The neonates admitted for observation and discharged within 24hrs were excluded from the study. The obstetric data and demographic data were retrieved from the labour room birth register.

Gestational age of the baby was calculated from the first day of last menstrual period (LMP) and in case of unknown LMP gestational age was calculated from the earliest ultrasonography. Babies borne before 37 completed weeks were considered as premature baby. Birth asphyxia was diagnosed as per American Academy of Paediatrics and American College of Obstetrics and Gynaecology (ACOG) guideline for hypoxic ischemic encephalopathy (HIE). Only culture positive (blood, CSF, urine, swab etc.) cases were considered under sepsis.

RESULT

In this retrospective observational study, 1618 deliveries were documented and among them 304 (58.88%) babies were admitted in the NICU. The incidence of NICU admission was18.78%. Among 304 admitted NICU babies, 179 (58.88%) were admitted with in 24 hour due to fulfilment of NICU admission criteria. Most of the NICU admitted babies were male babies (61.8%). It was also found that 58.8% mothers were from low socioeconomic backgrounds (Table 1).

Table 1: Demographic data of study population

Age (n=304)	No of cases	Percentage (%)
Less than 24hr	179	58.8
More than 24hr	125	41.1
Gender (n=304)		
Male	188	61.8

Cont... **Table 1: Demographic data of study population**

Female	116	38.1
Socioeconomic status(n=284)		
Low	167	58.8
Medium	99	34.8
High	18	6.3

Babies admitted to NICU, who were delivered by normal vaginal delivery accounts for 51.3%.(Table 2). Maximum number of (42.6%) of mothers belongs to age group 25-30 years (Table 3). It was revealed that, multi-parous mother accounts for 49.2 cases and 38% cases were primipara (Table 4).

Table 2: Mode of delivery of NICU babies (n=304)

Mode	No of cases	Percentage (%)
Normal delivery	156	51.3
Instrumental delivery	13	4.2
Caesarean delivery	135	44.4

Table 3: Maternal age distribution, n=284 (less than 304 NICU babies as 16 cases are twin and 2cases are triplet)

Age	No of cases	Percentage (%)
15-20yrs	18	6.3
20-25yrs	99	34.8
25-30yrs	121	42.6
>30yrs	46	16.1

Table 4: Parity of the Mother, n=284

Parity	No of cases	Percentage%
Primipara	108	38
Multipara	140	49.2
Grand multipara	36	12.6

In our study 49.3% babies were within normal weight (> 2.5 kg) whereas 34.2% cases were extremely low birth weight (<1 kg) (Table 5). Most common morbidities in this study were neonatal jaundice (49.3%) and prematurity (32.8%) (Table 6). Coming to outcome to NICU admission babies an encouraging number of babies 285 cases (93.7%) were improved whereas death account for 2.9% but 10 cases (3.2%) could not be followed up as they have left against medical advice (Table 7). Sepsis and birth asphyxia each attributes (33.3%) towards the cause of the death (Table 8).

Table 5: Birth weight of NICU babies

Weight in Kg	B	Percentage
<1Kg,ELBW	104	34.2
1-1.5Kg,VLBW	40	13.1
1.5-2.5Kg,LBW	10	3.2
>2.5Kg	150	49.3

Table 6: Diagnosis of NICU babies, n=304, but total more than n due to coexistent morbidities

Diagnosis	No of cases	Percen-tage %
Neonatal jaundice	150	49.3
Prematurity	100	32.8
Respiratory distress syndrome	84	27.6
Sepsis	66	21.7
Low birth weight	43	14.1
Birth asphyxia	31	10.1
Meconium aspiration	29	9.5
Necrotising enterocolitis	17	5.5
Congenital heart disease	9	2.9
Congenital malformation	5	1.6
Birth trauma	2	0.6
Intra cranial haemorrhage	4	1.3
Miscellaneous	3	0.9

Table 7: Outcome of neonatal admission, n=304

Outcome	No of cases	Percentage%
Improved	285	93.7
Death	9	2.9
Left against medical advice or referred	10	3.2

Table 8: Cause of death of NICU babies, n=9

Cause	No of cases	Percentages %
Sepsis	3	33.3
Birth asphyxia	3	33.3
Congenital diaphragmatic hernia	1	11.1
Meconium aspiration	1	11.1
Respiratory distress syndrome	1	11.1

DISCUSSION

In our study total number of NICU admission is 304 in number and total number of deliveries is 1618.Percentage of deliveries requiring NICU admission-18.78%. In a study by Wade Harrison Crude admission rate is 77.9per1000 livebirths in 2012. [16] In the present study 58.8% neonates were admitted within 24 hours of delivery and 61.85% cases were male.

In a study by Walana W, the dominant sex was males 54.0% and the remaining were females 46.0%. Admissions were significantly common among neonates within the age group ≤ 2 days. [17] 58.8% of parents belong to lower socioeconomic status in the present study which is similar to study by K suchita.[18] In the maternal characteristic study K suchita found 52.76% mother were multiparous which is similar to our result. (49.2%).In the Majority of cases(42.6%) in this study, the maternal age is within 25 to 30 years of age which is accordance to studies by Wade Harrison.[16]

Coming to mode of delivery in this study maximum number of neonates was delivered by normal delivery (51.3%) followed by caesarean section 44.4%. 32.7% were delivered by caesarean section in the study by Wade Harrison. In our study 49.3% cases are more than 2.5 kg in weight while percentage of ELBW,VLBW,LBW babies are 34.2,13.1,3.2% (total 50.7%)respectively. Study by K Suchita shows 65.52% cases to be more than 2.5kg weight. While Shabbir Hussain et al [19] has found 53.8% neonates were<2.5kg while 46.2%babies were >2.5kg in weight, which in accordance to our study.

Neonatal jaundice and the prematurity are the two important cause of morbidity in our study. Neonatal jaundice accounts for 49.3% of cases and prematurity accounts for 32.8% of cases. In a study by Sridhar et al, the most common specific morbidity for admission was neonatal sepsis (28.8%) followed by RDS (23.85%) and hypoxic ischemic encephalopathy (17.72%).[20] While Gaucham et al. in Nepal reported, neonatal jaundice, sepsis and perinatal asphyxia as being commonest indication for admission to NICU. [21] The number of deaths in this study is 9 cases and the number of cases who left the hospital against medical advice(LAMA) are 10. The death rate was 2.96% which means the number of death in 1000 live birth was approximately 30.

CONCLUSION

Neonatal jaundice and prematurity are the most common morbidity in our study, while birth asphyxia and sepsis are the two most common cause of mortality. All these causes of mortality and morbidity are clearly associated with maternal age, parity, socioeconomic status, birth weight of the neonate. The male preponderance may be due to the gender bias of the society. All these morbidities and mortalities can be prevented by proper antenatal care and intervention in right time. The number of death may not reflect the actual figure of the society as this is a hospital based study and we have not followed the LAMA cases. Further multi-centric trials are required.

Ethical Clearance: This study is approved from our institutional ethics committee.

Source of Funding: Self

Conflict of Interest: Nil

REFERENCES

1. World Health Organization. The World Health Report: Fighting Diseases and Fostering Development. Geneva: WHO, 1996.
2. Liu L, Oza S, Hogan D, Perin J, Rudan I, Lawn JE et al. Global, regional, and national causes of child mortality in 2000–13, with projections to inform post-2015 priorities: an updated systematic analysis. Lancet 2015; 385(9966): 430–440.
3. Registrar General of India. Sample registration system (SRS) statistical report 2013. New Delhi: 2013.
4. Bang AT, Reddy HM, Baitule SB, Deshmukh MD, Bang RA. The incidence of morbidities in a cohort of neonates in rural Gadchiroli, India: seasonal

and temporal variation and a hypothesis about prevention. J Perinatol 2005; 25(Suppl 1): S18–S28.

5. Liu L, Oza S, Hogan D, Perin J, Rudan I, Lawn JE et al. Global, regional, and national causes of child mortality in 2000–13, with projections to inform post-2015 priorities: an updated systematic analysis. Lancet 2015; 385(9966): 430–440.
6. Baqui AH, Darmstadt GL, Williams EK, Kumar V, Kiran TU, Panwar D et al. Rates, timing and causes of neonatal deaths in rural India: implications for neonatal health programmes. Bull World Health Organ 2006; 84: 706–713.
7. ICMR Young Infant Study Group. Age profile of neonatal deaths. Indian Pediatr 2008; 45: 991–994.
8. Bang AT, Paul VK, Reddy HM, Baitule SB. Why do neonates die in rural Gadchiroli, India? (Part I): primary causes of death assigned by neonatologist based on prospectively observed records. J Perinatol 2005; 25(Suppl 1): S29–S34.
9. HLEGHigh Level Expert Group Report on Universal Health Coverage for India. Public Health Foundation of India: New Delhi, 2011.
10. Fikree FF, Pasha O. Role of gender in health disparity: the South Asian context. BMJ 2004; 328(7443): 823.
11. Claeson M, Bos ER, Mawji T, Pathmanathan I. Reducing child mortality in India in the new millennium. Bull World Health Organ 2000; 78: 1192–1199.
12. Lee ACC, Katz J, Blencowe H, Cousens S, Kozuki N, Vogel JP et al. National and regional estimates of term and preterm babies born small for gestational age in 138 low-income and middle-income countries in 2010. Lancet Glob Health 2013; 1: e26–e36.
13. Chaudhari S, Bhalerao MR, Chitale A, Pandit AN, Nene U. Pune low birth weight study—a six year follow up. Indian Pediatr 1999; 36: 669–676.
14. National Neonatal Perinatal Database. Report for the year 2002–03. Available at http://www.newbornwhocc.org/pdf/nnpd_report_2002-03.PDF (accessed on 2 April 2016).
15. United Nations Children Fund (UNICEF) Coverage Evaluation Survey 2009. UNICEF: New Delhi, India, 2009.
16. Wade H,,David G Epidemiologic Trends in Neonatal Intensive Care,2007- 2012 JAMAPediatr.2015;169(9):855-862.
17. Walana W, Acquah Ekuban KS, Abdul-Mumin A, Naafu B, Aruk E, et al. Pattern, Causes and Treatment Outcomes of Neonatal Admission in the Tamale Teaching Hospital. Clinics Mother Child Health 2016; 13: 252.
18. K Suchita, Kontis S Study of epidemiological factors affecting neonatal morbidity and mortality in the neonates admitted to NICU of tertiary care centre. Indian journal of applied research, 2016; 6(2):198-201
19. Shabbir Hussain ,Neonatal Morbidity and Mortality Pattern in a Tertiary Care Neonatal Unit of a Teaching Hospital, Ann. Pak. Inst. Med. Sci. 2014; 10(1):7-11.
20. Sridhar PV, Thammanna PS, Sandeep M. Morbidity Pattern and Hospital Outcome of Neonates Admitted in a Tertiary Care Teaching Hospital, Mandya. Int J Sci Stud 2015; 3(6):126-129.
21. Gauchan E, Basnet S, Koirala DP, Rao KS. Clinical profile and outcome of babies admitted to Neonatal Intensive Care Unit (NICU). J Inst Med 2011; 33:1-5.

Students' Perception and Attitude on Education Curriculum and System in an Indian Dental School

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ABSTRACT

Background: The continuous evaluation of the fundamental methodologies by feedback in teaching-learning will lead to better understanding of the profession eventually.

Objective: the objective of this study is to evaluate the students' perspective on dental education and attitude towards dental education and determine whether there is a need for a change in curriculum.

Materials and method: A total no. of 216 dental students were invited to participate in the online questionnaire survey, to assess their attitude and perspective towards the study topic. The data was statistically analyzed using SPSS version 20 and descriptive analysis was done.

Results: Students are in agreement with Problem Based Learning pattern and clinically oriented curriculum, with increased no. of clinical hours and wider range of pre-clinical exercises with audiovisual aids, including comprehensive patient care with more case discussions.

Conclusion: Students desire to have student centered active learning with teaching more clinically oriented using audio visual aids with comprehensive patient care training to help them in their future clinical practice.

Keywords: *Education Curriculum, Students' Perception and Attitude, Teaching-learning, Problem Based Learning, Patient care*

INTRODUCTION

Oral health is an important yet neglected health issue, especially in developing countries, like India. The onus of the same belongs to dental fraternity. The foundation of good oral health care lies in the motivation and training of dental students. Learning is soon shifting from being teacher centric to student centric.[1] Efficiency with which students learn directly affects their quality of work and finally patient satisfaction.[2] Dentistry is a profession in which both, theoretical knowledge and hand skills are of equal importance. Though a strong theoretical base is important, it must be supplemented with equal or more practical training. Both together build a firm ground for good dental practice. Fundamental understanding of the subject during learning process leads to better applicability of the knowledge and skill in future. The continuous evaluation of the fundamental methodologies and basics in learning as well as teaching will lead to better outcome of the product and better understanding of the profession eventually. This will lead to better health care delivery to provide better service to the humanity. So, feedback from the students and the teachers at regular intervals depending on the changing scenario of the profession is very important for contemporary approach to upgrade the teaching learning program.

Hence, the purpose of this study was planned

The objectives were to evaluate students' perspective towards:

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Didactic theory classes by questionnaire method.

Pre-clinical, practical exercises by questionnaire method.

Clinical curriculum by questionnaire method.

METHODOLOGY

A total no. of 216, IV BDS dental students and interns were invited to participate in survey after obtaining ethical clearance. E-Questionnaires were distributed by sending a link to the participants containing 15 questions each to assess their attitude and perspective. The received responses were tabulated and statistically analyzed using SPSS version 20 and descriptive analysis was done.

RESULTS

Results of the questionnaire regarding theory classes are represented in figure 1. Approximately 58.3% of all participants agreed 9.3% strongly agreed that theory class content is applicable to cases treated in clinic. Many students (53.5%) agreed that time duration of individual theory classes are appropriate. Power point presentations and audio-visual aids were considered to be helpful by the participating students (56.3%). 66% of all participants strongly agreed that problem based learning will be beneficial. It was found that 64.2% of the dental students strongly agreed that the curriculum should be more practical oriented and less cumbersome.

RESULTS

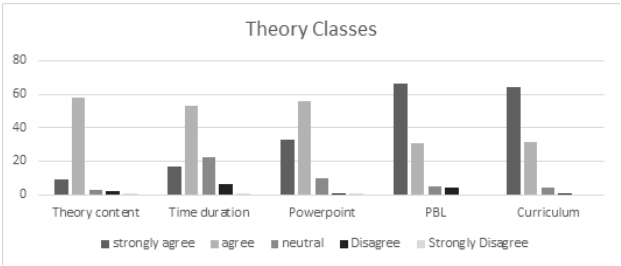

Figure 1: Students responses regarding lecture classes. Question 1 to 5

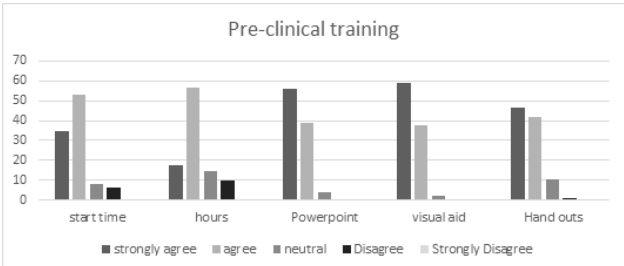

Figure 2: Students' responses regarding pre-clinical training.

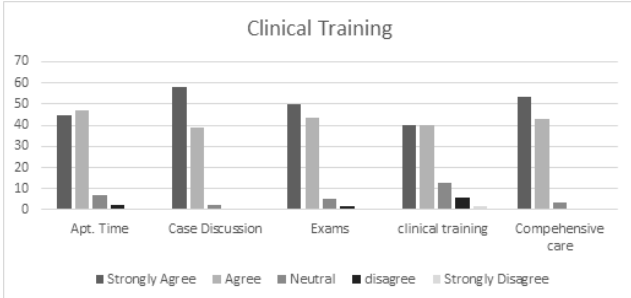

Figure 3: Students' responses regarding clinical training. Question 12-15 Question 6-11

Results of the questionnaire regarding pre-clinical training are represented in figure 2. 53.5% students agreed that second year is the correct time to start preclinical training. Although approximately 56.7% students agreed number of hours allotted to pre-clinical training is enough, 56.1% strongly agreed more procedures and techniques should be taught during preclinical training. Video demonstrations were considered helpful before the exercise by 59.1% of the students. Most students (46%) felt the need to receive demonstrative hand-outs before the preclinical exercise.

Results of the questionnaire regarding clinical training are represented in figure 3.

Third year seemed like an appropriate time to start treating patients by a large majority of students (91.7%). Majority students (57.7%) strongly agreed case discussion with faculty before treating the case is helpful. 50% strongly agreed student's clinical assessment during postings improves their competence. Approximately 40% agreed Clinical training equips to treat patients in our private practice after course completion. Moreover, a large majority 53% strongly agreed that comprehensive care training should be offered.

DISCUSSION

Students' view of education experience can also be an important source of information for curriculum assessment.[6]In our study, we have divided learning in dentistry into three different categories. The categories are: learning in theory classes, learning of basic skill in pre-clinical training, and learning during clinical hours providing patient care.

Regarding the lecture classes, according to present study, a majority of students agreed that even though the theory class contents are more than sufficient, the contents could have been more clinically oriented and less cumbersome (Figure 1). The current undergraduate

curriculum is more theory based and less skill based. It is heavily packed leaving very less time for students to acquire a deep understanding of the subject and clinical skills. Thus making it difficult to develop lifelong skills such as critical thinking, problem-solving and communication.[7] There lies a necessity to integrate a need-based curriculum which is outcome based, involving the needs of students, the community, clinical practice and dental research.[8]

A majority of students agreed that time duration of the lecture classes was appropriate which is an average of forty-five minutes (Figure 1). This is in compliance with the recommend class time of forty-five minutes.[9] Studies have proven that there is a lapse in attention after the initial 10-18 minutes and this is regardless of how compelling the lecture is thus the optimum length of lectures should be thirty minutes instead of sixty minutes.[10] However, to comply with rules regarding hours dedicated to lectures and with limited time, pedagogical techniques and group discussions are recommended to overcome the short attention span of students.[11-14] Moreover, teachers have to follow recommendations by the dental council. This study recommends to modify the syllabus time to time to fulfil the needs of the future generation.

Majority of students felt the need for incorporating problem-based learning (PBL) in their dental school education (Figure 1). It helps students to relate themselves to clinical scenario because such a model of learning is an accurate reflection of real-life learning. Hence PBL is very suited to professional education programs like dentistry where it depends not only on knowledge but also on clinical applications.[15]It also inculcates an attitude of constant learning which is a necessity in today's era of evidence-based learning.

Students preferred audio-visual aids in lectures in our study (Figure 1) which is in agreement with other studies since it helps them to learn more efficiently, organize their class notes and thus improve the students' performance. [2,16-19] In contrary, Susskind found that though helpful, Powerpoint presentations (PPT) did not enhance the performance of students.[20] The reason for preferring PPT maybe perhaps due to most of our topics involve pictures of clinical and laboratory cases. Moreover, it not only saves time for the teacher during lecture hours but also able to create a picture of clinical procedures, which will have a long lasting impact in the mind of students.

The ultimate goal of the preclinical dental training is to prepare students to deliver the best possible care in the clinic by simulating the clinical conditions in laboratory. The students are then expected to build on that foundation during their clinical education and graduate, ready to enter practice.[21] Based on the responses to the questionnaire, it was found that a majority of students consider the number of hours dedicated to preclinical training to be sufficient (Figure 2) and second year of dental school is an appropriate time for preclinical exercises both in operative dentistry and prosthodontics (Figure 2) and it also satisfies the syllabus suggested by Dental Council of India. A vast majority of students felt wider range of preclinical dental procedures and techniques (Figure 2) like preparations for ceramic crowns, veneers, and inlays should be taught which may improve the relevance of preclinical courses in similar dental school settings.[21, 22]

In the present study, students find, video demonstrations of the preclinical procedures as well as handouts about the procedure, of great value (Figure 2). This is in agreement with previous studies which had received a positive response from students, when their school included audio-visual aids and educational handouts to their course structure.[22] Visual aids help students' conceptualize better and gives them a clear understanding and handout will help them for future reference.

The degree of understanding clinical training and patient treatment is most critical and is the basis of students' professional career as a dentist. Majority of students agreed that the third year of their dental education was the appropriate time to start treating patients (Figure 3). Contrary to our study, in another study, dental students feel that they have lost out on time that could be spent on treating patients especially in the first half of dental school curriculum which curbs the experience of clinical learning.[23] Another study has pointed out that students are unable to judge the significance of their education until sometime after they graduate and have practiced dentistry on their own.[24]Hence it is better to increase the hours of clinical postings in nodle centres or in private clinics/ corporate clinics during undergraduate training may help to train the students for clinical practice.

Students have strongly agreed that discussing treatment plan and obtaining guidance from faculty

before treating a particular case is helpful to them (Figure 3). The skills and techniques that students learn in the clinical setting heavily depend on their interaction with faculty who also serve the role of a guide and mentor,where teaching, mentoring and patient treatment co-exist, in a pressing environment. [25, 26]

In our study, students found timely clinical assessments and tests are helpful (Figure 3) to get feedback from the faculty to improve themselves. Proper assessment drives and stimulates for deeper learning, but this cannot be generalized.[27, 28] When a well- planned assessment has a clear objective, provides feedback immediately to students, fulfills its rightful role and comprises an integral part of the educational process.[29]

Dental education puts forth a unique challenge of preparing future health professionals. This involves teaching a multitude of skills that go beyond the content of periodic assessments and tests. A students' self-confidence is a significant concern in all phases of dental curriculum.[30] In this study, a significant percentage of students felt that their undergraduate dental education equips them well to work successfully in private practice (Figure 3). It is understood that undergraduates will not attain complete clinical excellence at the time of graduation. Nonetheless, there lies a responsibility with dental educators to equip students with the necessary self-assessment ability, clinical reasoning, initial self confidence and preparedness for professional life and the ability to practice independent dentistry safely.[26]

Students that participate in this study felt the need for comprehensive clinical training (Figure 3). This can be due to the fact that treatment provided in a comprehensive clinic setting mimics the setup of a private practice. It gives the students a chance to build strong bonds with the patients and see the effects of treatment delivered. Comprehensive clinical training environment has been known to offer a lot in an educational setting.[26] Schools offering comprehensive care approach to clinical education observed that it enhanced the students' clinical experience.[31]

CONCLUSION

Within the limitations, from the present study it can be concluded that:

1. Students prefer an educational environment that is based on active learning rather than passive information delivery from faculty. Theory classes can be aimed at being more application oriented and presented using audio visual aids.
2. Pre-clinical training can include more clinically oriented procedures to enhance clinical performance in later years.
3. Students also felt that comprehensive care training would help in their future clinical practice.

This study provides an insight for curriculum planners. Teaching environment based on student's preferences will aid effective learning.

Ethical Clearance: By Institutional Ethics Committee MCODS, Mangalore

Conflict of Interest: Nil

Source of Funding: Nil

REFERENCES

1. Patil AA, Chaudhari VL. Students' perception of the educational environment in medical college: a study based on DREEM questionnaire. Korean journal of medical education. 2016 Sep;28(3):281.
2. Parolia A, Mohan M, Kundabala M, Shenoy R. Indian dental students' preferences regarding lecture courses. Journal of Dental education. 2012 Mar 1;76(3):366-71.
3. Gopalakrishnan S, Mathew P, Vaidyanathan K. Attitude of bachelor of dental surgery students and interns toward teaching-learning process in Government Dental College, Kottayam, Kerala, India. Indian Journal of Dental Research. 2017 May 1;28(3):256.
4. Albino JE, Young SK, Neumann LM, Kramer GA, Andrieu SC, Henson L, Horn B, Hendricson WD. Assessing dental students' competence: best practice recommendations in the performance assessment literature and investigation of current practices in predoctoral dental education. Journal of Dental Education. 2008 Dec 1;72(12):1405-35.
5. Zitzmann NU, Yoon-Büchel N, Bühler J, Dettwiler CA, Weiger R. Evaluation of the dental curriculum at the University of Basel. Does the Master of Dental Medicine adequately prepare for the professional practice?Swiss dental journal. 2016;126(12):1134-45.

6. Victoroff KZ, Hogan S. Students' perceptions of effective learning experiences in dental school: a qualitative study using a critical incident technique. J Dent Educ 2006;70(2):124–32.
7. Lujan HL. Too much teaching, not enough learning: what is the solution? AJP: Advances in Physiology Education. 2006Jan;30(1):17–22.
8. Shelty VB, Shirahatti RV, Pawar P. Students perceptions of their education on graduation from a dental school in India. J Dent Educ 2012;76:1520-1526.
9. Arredondo MA, Busch E, Douglass HO, Petrelli NJ. The use of videotaped lectures in surgical oncology fellowship education. J Cancer Educ 1994;9:86–9
10. Middendorf, J., and Kalish, A. The "change-up" in lectures. Natl. Teach. Learn. Forum 1996; 5(2), 1–5.
11. Mitov G, Dillschneider T, Abed MR, Hohenberg G, Pospiech P. Introducing and evaluating MorphoDent, a web-based learning program in dental morphology. J Dent Educ 2010;74(10):1133–9. 22.
12. Huang C, Bian Z, Tai B, Fan M, Kwan CY. Dental education in Wuhan, China: challenges and changes. J Dent Educ 2007;71(2):304–11. 23.
13. Zakrzewska JM, Fry H, Larkin KE. A case study of methods used to tackle a common pedagogic problem in medical and dental education: time pressure. Med Teach 2003;25(4):391–7. 24.
14. Sweet J, Wilson J, Pugsley L. Educational innovations for dentistry. Br Dent J 2009;206:29–34.
15. Jacob PS. Problem based learning in dental education. J Educ Ethics Dent 2011;1:7-11.
16. Alhamdan EM, Tulbah HI, Alduhayan GA, Albedaiwi LS. Preferences of Dental Students towards Teaching Strategies in Two Major Dental Colleges in Riyadh, Saudi Arabia. Education Research International. 2016; 1–8.
17. R. B. Lowry, "Electronic presentation of lectures: effect upon student performance," University Chemistry Education 1999; vol. 3, no.1,pp.18–21.
18. A. Szabo and N. Hastings, "Using IT in the undergraduate classroom: should were place the black board with PowerPoint?" Computers and Education 2000; vol.35,no.3,pp.175–187,
19. Kask, S. (2000). "The Impact of Using Computer Presentations (CAP) on Student Learning in the Microeconomics Principles Course." Presented at American Economic Association meeting, Boston, Massachusetts.
20. Susskind JE. PowerPoint's power in the classroom: enhancing students' self-efficacy and attitudes. Comp Educ 2005;45:203–15.
21. Velayo BC, Stark PC, Eisen SE, Kugel G. 2014. Using dental students' preclinical performance as an indicator of clinical success. J Dental Educ 78(6):823–828
22. Henzi D, Davis E, Jasinevicius R, Hendricson W. In the students' own words: what are the strengths and weaknesses of the dental school curriculum? J Dent Educ 2007: 71: 632–645.
23. Ingebrigtsen, J., Roynstrand, E. and Berge, M.E. An evaluation of the preclinical prosthodontic training at the Faculty of Dentistry, University of Bergen, Norway. European Journal of Dental Education 2008, 12, 80-84.
24. Henzi D, Davis E, Jasinevicius R, Hendricson W. North American dental students' perspectives about their clinical education. J Dent Educ 2006;70(4):361-77
25. Dagenais ME, Hawley D, Lund JP. Assessing the effectiveness of a new curriculum: Part I. J Dent Educ 2003: 67: 47–53.
26. Divaris K, Barlow PJ, Chendea SA, Cheong WS, Dounis A, Dragan IF, et al. The academic environment: the students' perspective. Eur J Dent Educ 2008;12(Suppl 1): 120-30
27. McLachlan JC. The relationship between assessment and learning. Med Educ 2006: 40: 716–717. (28) Olson BL, McDonald JL. Influence of online formative assessment upon student learning in biomedical science courses. J Dent Educ 2004: 68: 656–659.
28. Manogue M, Kelly M, Bartakova Masaryk S, et al. 2.1 Evolving methods of assessment. Eur J Dent Educ 2002: 6 (Suppl. 3): 53–66.
29. Polychronopoulou A, Divaris K. Perceived sources of stress among Greek dental students. J Dent Educ 2005: 69: 687–692.
30. White JM, Jenson LE, Gansky SA, Walsh CJ, Accurso BT, Vaderhobli RM, et al. Dental Students Clinical Experience Across Three Successive Curricula at One U.S. Dental School. Journal of Dental Education. 2017Jan;81(4):366–77.

Perception of Anganwadi Services in Urban ICDS Blocks in Kozhikode Corporation –A Cross -Sectional Study

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ABSTRACT

Introduction: Integrated Child Development Services is the largest national programme for the development of mothers and children in the world. The services are rendered through Anganwadi worker (AWW) at Anganwadi centre (AWC). An evaluation study is carried out to assess the perception of anganwadi services provided by the beneficiary mothers of 3 to 6 year old children in Urban ICDS blocks in Kozhikode Corporation

Method: A cross sectional descriptive study was carried out in 4 urban ICDS blocks in Kozhikode. Data was collected using pretested semi structured questionnaire and interviewing beneficiary mothers of 3 to 6 year old children .

Results: Out of 234 mothers interviewed, 221(94.4%) of mothers perceived that the children were getting supplementary nutrition regularly from anganwadi centres. A large majority 196(83.8%) of mothers were satisfied with the PSE activities conducted in AWC'S. A large proportion 207(88.5%) of mothers perceived that AWW's did not inform about the date, time, place of health checkup. A large proportion of mothers 158(67.5%) felt that AWW's did not offer any referral advice for the children during illness. About 129(55.1%) of mothers perceived that health education session were conducted occasionally in AWC's.

Conclusions: In conclusion according to mother's perception health checkup ,health education services and referral services were poor.

Key-words: *Supplementary nutrition, Preschool education, Health checkups, Referral services, Immunisation, Health education*

INTRODUCTION

Integrated Child Development Services described as India's gift to her children helps to achieve major national nutrition and health goals embodied in National policy for children (1974),National health policy(1983),National plan of action for children(1982),National nutrition policy(1993)[1]. ICDS was launched in 1975 with 33 projects. This programme is formulated to enhance the health, nutrition and learning opportunities of infants, young children and their mothers especially targeting for the poor and deprived. ICDS serves the target groups through network of anganwadis[2]. The centre is run by local community based women called AWW who is supported by another women anganwadi helper in service delivery[3]. The specific services provided through programme are Supplementary nutrition programme, Preschool education, Immunisation, Health checkup, Referral services, and Nutrition and health education[4]. ICDS has expanded remarkably in its scope and coverage, and today it covers around 33.738 million

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children between three to six years of age, 39.871 million children between 6 months to three years, 18.047 million expectant and nursing mothers[5]. In Kerala, it covers around 4, 64249 children between three to six years of age and 4, 21540 children between 6 months to 3 years and 1, and 95927 pregnant and lactating mothers [5].

To improve on the functioning of the anganwadis in urban areas, it is necessary to evaluate the services. Hence a study on perception of ICDS services of urban anganwadis is planned . This study brings in to focus certain bottlenecks and shortcomings in implementation of the programme in urban areas which can help in improving the services in the urban anganwadi centres. It helps us to improve health service delivery by producing information relevant to decision – making and assist planners and managers in making improved decision about programme and project. In this context this study was undertaken to assess package of services provided by the ICDS programme to 3 to 6 years children by assessing the perception of beneficiary mothers for uplifting the status of children .

METHOD

A community based cross sectional descriptive study was carried out in 4 urban ICDS blocks in Kozhikode Corporation. Keeping in view of prevalence of average and below average anganwadis in a study in Bangalore city by Vaijayanthi et al in 2010 noted as 54%, a confidence level of 95%, absolute precision of 9.2%, a sample size of 117 anganwadi centres was calculated[6].Using Simple random sampling method sample size of 117 anganwadi centres were selected from total 543 anganwadi centres in Urban Kozhikode Corporation. Data was collected over a period of one year from July 2012 to June 2013.Ethical clearance was obtained from institutional ethics committee and relevant permission from Social welfare department in Kerala. From each AWC 2 mothers – were selected by simple random sampling method. So 234 mothers of registered beneficiaries of 3 to 6 year old children were included to assess the perception regarding services provided by the Anganwadi centres. Using various tools for data collection which included pretested semi structured questionnaire and interviewing mothers of registered beneficiaries of 3 to 6 year old children. Data entered in MS excel and analysed using SPSS Software.

RESULTS

To assess the perception of mothers of beneficiary children, 2 mothers from 117 anganwadi centres were selected using simple random technique. Totally, 234 mothers were interviewed.

GENERAL CHARACTERISTICS

Out of 234 women, most number were educated up to high school 66(28.2%) and higher secondary 62(26.5%). 73(31.1%) educated up to lower and upper primary. There were 33(14.1%) educated up to graduate and above. In our study 129(55.1%) of mothers were from three generation families, 67(28.6%) were joint families and only 38(16.2%) were from nuclear families. Among 234 mothers 131(56%) were living in semipucca houses, 101(43.1%) in pucca houses. Only 2(0.9%) were staying in kutcha houses. Income was assessed using the APL//BPL cards, based on this large proportion of family of mothers 156(66.7%) were having APL card, rest of the families 78(33.3%) were having BPL card.

Table1. General characteristics of respondents

General characteristics	No.(n=234)	%
Literacy Level		
Primary	73	31.1%
High school	66	28.2
Higher secondary	62	26.5
Graduate & above	33	14.1
Family Type		
Nuclear	38	16.2
Joint	67	28.6
Three generation	129	55.1
Housing Type		
Kutcha	2	0.9
Semipucca	131	56.0
Pucca	101	43.1
Income Status		
APL	156	66.7
BPL	78	33.3

BASIC INFORMATION ON FUNCTIONING OF AWC

A large proportion 221(94.4%) of mother were of perception that AWC opens and works regularly. About 181(77.4%) of mothers reported that AWC'S were at a walk able distance from their residence. There were 53(22.6%) perceived that their residence was far off from the anganwadi's. Mothers were enquired about the reasons for sending children to anganwadi's. In this study it was observed that ,130 (55.6%) mothers reported education was a major priority for mothers for sending their children to AWC's followed by supplementary nutrition 76(32.5%). About 28(12%) mothers reported that they send children to anganwadi's for both food and education.

PERCEPTION REGARDING SERVICES PROVIDED IN ICDS CENTRES

In this study among 234 mothers, 221(94.4%) of mothers perceived that the children were getting supplementary nutrition regularly from anganwadi centres. Most of the mothers 169(72.2%) were of opinion that quality of supplementary nutrition was average and only 26(11.1%) perceived as good quality. About 39(16.7%) reported that food is of poor quality and they mentioned that sometimes spoiled food was given in anganwadi centres. Majority 144(61.5%) of mothers reported that AWW's monitor the growth of child once in a month and 89(38.1 %) of mothers opined that growth monitoring was done once in 3 months or occasionally

Most number 196(83.8%) of mothers were satisfied with the PSE activities conducted in AWC'S. There were 38(16.2%) of opinion that they were not satisfied with the PSE activities. A large proportion 170 (72.6%) of mothers perceived that PSE activities in the AWC helps in improving the psychological development of the child and 64(27.4%) of mothers informed that PSE activities does not improves the same.

The majority 182(77.8%) of mothers reported that AWW's informs mothers on date, time and place of immunisation sessions and rest 52(22.2%) of mothers were reported that AWW's did not inform them on immunisation sessions. There were 129 (55.1%) of mothers were perceived that health education session were conducted only occasionally in AWC'S and 67(28.6%) of mothers were of opinion that health education session were conducted monthly or 3 monthly in AWC's.

A large proportion 207(88.5%) of mothers opined that AWW's did not inform them about the date, time, place of health check up .In our study 142(60.7%) of mothers reported that AWW's counselled them during sickness of children and 92(39.3%) of mothers perceived that there was no counselling. A large proportion 220(94%) of mothers opined that they did not receive medicines from AWW's. Most number of mothers 158(67.5%) felt that there was no referral from AWW'S.

Table 2: Perception of mothers regarding services of AWC'S

Services of AWC's	Proportion of respondents who said "YES"- No.(n=234)	%
SUPPLEMENTARY NUTRITION PROGRAMME		
Regularity in Getting SNP	221	94.4
PRE SCHOOL EDUCATION		
PSE activities-Satisfaction	**196**	**83.8**
PSE improves psychological development	**170**	**72.6**
IMMUNISATION		
AWW informs immunisation	**182**	**77.8**
HEALTH CHECKUP		
AWW'S informs on health check up	27	11.5
Counselling during sickness	142	60.7
Received medicines	**14**	**6.0**
REFERRAL SERVICES		
Referred children	**76**	**32.5**

DISCUSSION

A study by Manoj Kumar tripathy etal(Orissa 2011) observed that 94% of mothers perceived that AWC'S opens and works regularly and 55.5% of mothers are of opinion that AWC's were walkable distance from their residence[7]. Pandey etal (Lucknow 2013) reported that 33.8% of respondents perceived that the purpose of enrolment at AWC's of their children was learning [8].

NCAER (2001) revealed that 42 % of households reported good supplementary nutrition in anganwadi's[9]. Manoj Kumar tripathy etal in his study mentioned that 73.5% of mothers reported that supplementary food is acceptable to the children[7]. Jose bobhan (Kerala 2006) noted that 75.5% of mothers reported regular supplementary feeding in AWC's[10]. According to Pratichi child report (West Bengal -2009),50% of mothers reported low quality of food in anganwadi[11].

About 46% of mothers reported no weighing of children in anganwadi's according to (Pratichi report West Bengal -2009)[11]. NCAER (2001) showed that, 62.1% of mothers reported growth monitoring in anganwadi[9]. Manoj Kumar tripathy etal observed that 88.5% of mothers reported growth monitoring in anganwadis[7].

According to NCAER (2001) , 93.3% of mother reported that anganwadi's provided preschool education[9] . In the Pratichi child report (West Bengal -2009), 28% of mothers reported no PSE in anganwadi's[11].Manoj kumar tripathy etal(Orissa 2011) reported that 55% of mothers reported play mode learning in centres and the same study also mentioned that only 27% of mothers are of opinion that preschool educational activities aid in psychological growth of children[7].Nibharani etal (Assam 2001) reported that only 26.67% of mothers satisfied with nonformal preschool education provided by anganwadi's[12]. According to NCAER (2001) 74.8% of the households reported regular healthcheckup by anganwadi[9]. Ram prabhakar (Kolkata 2012) 77.8% of respondents reported that AWW had never counselled regarding health issues[13].

CONCLUSION

In conclusion according to mother's perception health checkup, health education and referral services were poor. There is a need for effective coordination between the health functionaries and the anganwadi workers in health checkups and referral services, nutrition and health education and referral services.

Conflict of Interest- Nil

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REFERENCES

1. International Institute for Population Sciences, National Family Health survey (NFHS-3), Volume3. Newdelhi: MOHFW; 2005-06:p94-95.
2. Rajwir Bhalwar .Textbook of public health and community medicine , Edition 1.Department of community Medicine ,Armed Forces medical college ,Pune ; 2009 :
3. Planning evaluation organization, Evaluation study on ICDS , Vol.1. New Delhi :Planning commission Government of India ; 2001 :p38
4. Park K. Park's Text Book of Preventive and Social medicine (2011), Edition 21.M/s Banarsidas. Bhanot Publishers, 1167, Prem nagar, Jabalpur, India. :
5. Statewide number of beneficiaries under ICDS scheme. Available at: http://www.wcd.nic.in/NAP aug16A.pdf.html. Accessed October 12th, 2012.
6. DELL foundation,,Analysing the ICDS anganwadi centres in Bengaluru,edition 1 .Bengaluru :DELL ; 2010:p1
7. Partech trust, The Pratichi child report - A Study on the delivery of ICDS in West Bengal, Edition 1.West Bengal: Pratichi trust; 2009:p4.
8. National Council of Applied Economic Research, Concurrent Evaluation of Integrated Child Development Services, Volume1.New Delhi: NCAER; 2001.
9. Manojkumar tripathy Barriers in accessing child development programme in Daringbadi block centre for children KIIT school of rural management Bhubaneshwar &UNICEF ; 2011:p21-24
10. Nibha Rani Burman Functioning of Anganwadi centres under ICDS scheme : An Evaluative study –Assam Agricultural university , Faculty of Home science ,Department of child development and family relations ,Jorhat ,Assam (2001):p87
11. Pandey V Perception about ICDS services in a rural population of Lucknow, Uttarpradesh Indian journal of community health . 2013;25(3):p257
12. K. Jose Boban Supplementary Feeding in ICDS: Present System of Food Purchase,Distribution and Satisfaction of Beneficiaries- Loyola College of Social Sciences, Thiruvananthapuram, Kerala;2006:p119
13. Ram Prabhakar A Cross sectional study on client satisfaction of Anganwadi centres under ICDS scheme in a slum of Kolkata National Journal of Community medicine.2014:5(1):p89.

Prevalence and Factors Associated with Depression among the Students of a Medical College in Kerala

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ABSTRACT

Introduction: Depression has a higher prevalence among medical students compared to general population. This could lead to deteriorating academic performance, errors in patient care and even suicides. There are hardly few studies conducted in this part of the country to assess the prevalence of depression among medical students and also the factors associated with it. Also, there are no studies which have used the new version of the Beck's Depression inventory (BDI-II). Hence in this background the present study was undertaken

Methodology: This was a cross-sectional study done at DM Wayanad Institute of Medical Sciences, Wayanad District, Kerala, between October 2017 and January 2018. All the undergraduate medical students of the college were the study subjects. Data was collected using a predesigned and pretested self-administered questionnaire (Beck's Depression Inventory II). Completed responses were obtained from a total 720 students.

Results: 68.5% were found to have no depression and 31.5% depression. 15.1%, 9.3% and 7.1% were found to have mild, moderate and severe depression respectively. Prevalence of depression was ***more*** among males compared to females, unmarried subjects compared to married, Part I-Final Phase students compared to other phases, NRI quota students compared to other quotas, Muslims compared to other religions, urban origin students compared to rural and those with a history of major life event, chronic illness, feeling of loneliness, backlog in academics, consumption of alcohol and tobacco compared to those without. However only **place of origin, h/o major life event, feeling of loneliness, backlog in academics and h/o consumption of tobacco and alcohol were found to have statistically significant association with depression.**

Conclusion: The Prevalence of depression in our study was lower compared to other studies. Urban origin, h/o major life event, feeling of loneliness, backlog in academics and h/o consumption of tobacco and alcohol were found to be associated with presence of depression

Keywords: *Depression, students, medical college, Kerala, Beck's Depression inventory II*

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INTRODUCTION

Depression is a mental disorder characterized by loss of interest and pleasure (anhedonia), decreased energy (anergy), feelings of guilt or low self-worth, disturbed sleep and/or appetite, and poor concentration.[1] It is a significant contributor to the global burden of disease and affects people in all countries across the

world with a global prevalence of depressive episode of 3.2%. Depressive disorders often start at a young age and often are recurrent throughout life. For these reasons, depression is the leading cause of disability worldwide in terms of total years lost due to disability. The demand for curbing depression and other mental health conditions is thus on the rise globally.[2]

Worldwide, it has been demonstrated that 25–90% of medical students are stressed, and stress is an important determinant of depression leading to a higher prevalence of depression among medical students than general population.[3,4,5,6] Several factors may account for this fact. These include daily life stressors and stressors specific to the tedious learning environment.[7] The potential negative effects of emotional distress on medical students include impairment of functioning in classroom and clinical practice, stress-induced disorders and deteriorating performance. In medical doctors, it has been demonstrated that depression affects patient care leading to increased prescription error.[8] Depression is also associated with higher suicide rates and this may be reason for higher suicide rate in medical professionals than the general population.[9] This is especially true in female medical professionals.[10] Students in extreme stress or depression need serious attention, otherwise inability to cope successfully with the enormous stress of education may lead to a cascade of consequences at both personal and professional levels.[11]

To prevent depressive symptoms among medical students, decreased self-esteem, self-perceived medical errors and thus improve on the quality of care given to patients, factors associated with depression in medical training should be identified and appropriately tackled.[12]There are hardly few studies conducted in this part of the country to assess the prevalence of depression among medical students and also the factors associated with it. Also, there are no studies which have used the new version of the Beck's Depression inventory (BDI-II). BDI-II was developed for the assessment of symptoms corresponding to criteria for diagnosing depressive disorders listed in Diagnostic and Statistical Manual of Mental Disorders; Fourth Edition (DSM-IV, 1994).[13] In this background, the present study was undertaken to find out the prevalence of depression among medical students and also the factors associated with it using the new version of the Beck's Depression inventory (BDI-II).

MATERIALS AND METHOD

This was a cross-sectional study done at DM Wayanad Institute of Medical Sciences, Wayanad District, Kerala, between October 2017 and January 2018. All the undergraduate medical students of the college (i.e., phase I to phase III, part II) willing to participate in the study were the study subjects. After obtaining approval from the college administration, the students were approached individually in their hostel rooms and briefed about the purpose of the study. Participation in the study was voluntary. Oral informed consent was taken from the subjects and data was collected using a predesigned and pretested self-administered questionnaire, the first part of which had questions pertaining to basic socio demographic details and possible factors contributing to depression and the second part Beck's Depression Inventory II. The Beck Depression Inventory–Second Edition (BDI-II) is a 21-item self-report instrument developed by Aaron Beck (1996) for measuring the severity of depression among adults and adolescents aged 13 years and older. The composition of items has been carefully constructed which are related to depressive symptomatology such as hopelessness, irritability, guilt feelings, fatigue, lack of interest in sex, loss of pleasure, and also feelings of suicide thoughts/wishes etc. Each item in BDI-II is assigned a score 0 to 3. Thus, the total score of each participant ranges from 0 to 43. The interpretation of final scores is as follows; 0-13 → no depression, 14-19→ mild depression, 20-28→ moderate depression and 29-63→ severe depression.[13] Completed responses were obtained from a total 720 students. The respondents were asked not to mention their names for maintaining anonymity and also to encourage participation and elicit truthful response. Data were kept confidential.

Data were entered in MS Excel and analyzed using Statistical Package for Social Sciences v21.0. Descriptive statistics such as mean and percentage and also inferential statistics like Chi-square test to find out association were used.

RESULTS

The total number of subjects were 720 of which 263(36.5%) were males and 457(63.5%) females. 23(3.2%) were married and 696(96.7%) were unmarried. 173(24%), 270(37.5%), 148(20.6%), 129(17.9%) were from Phase I, Phase II, Phase III part I and Phase III, Part

II respectively. The mean age of the subjects was 21.03 + 1.55 years.

Out of the total 720, 493(68.5%) were found to have no depression, 227(31.5%) were found to have depression. 109(15.1%), 67(9.3%) and 51(7.1%) were found to have mild, moderate and severe depression respectively (graph 1). Prevalence of mild depression was more among females, whereas moderate and severe depression was more among males (graph 2). Prevalence of mild and moderate depression was highest among management quota students, whereas severe depression was highest among NRI quota students (graph 3). Prevalence of mild depression was highest among Phase II students, moderate depression among Phase I students and severe depression among Phase III, Part I students (graph 4). Prevalence of mild depression was highest among Muslims, moderate depression among Hindus, and severe depression among Christians (graph 5). Prevalence of mild and severe depression was higher among unmarried students whereas moderate depression was higher among married students (graph 6). Prevalence of mild depression was higher among rural students whereas moderate and severe depression were higher among urban students (graph 7).

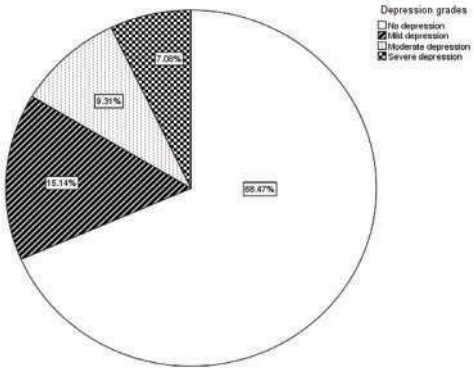
It was observed that the prevalence of depression was more among males compared to females, unmarried subjects compared to married, Part I-Final Phase students compared to other phases, NRI quota students compared to other quotas, Muslims compared to other religions, urban origin students compared to rural and those with a history of major life event (loss of a close family member or friend, road traffic accident, break up, hospitalisation for major illness etc., in the last 3 years), chronic illness (sickle cell disease, asthma, diabetes, hypertension etc.,) feeling of loneliness (due to living away from home/ parents/siblings/friends), backlog in academics, consumption of alcohol (> once a week) and tobacco (at least once daily) compared to those without. However only place of origin, h/o major life event, feeling of loneliness, backlog in academics and h/o consumption of tobacco and alcohol were found to have statistically significant association with depression (table I).

Table I: Factors associated with depression

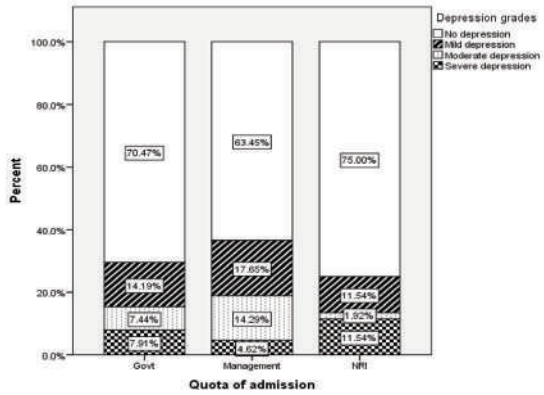
Variables		Depression present	Depression absent	Total	*P* value
Sex	**Male**	**90(34.2)**	173(65.8)	263(100)	0.24
	Female	137(30)	320(70)	457(100)	
Marital status	**Married**	7(30.4)	16(69.6)	23(100)	0.91
	Unmarried	**220(31.6)**	477(68.4)	697(100)	
Phase of MBBS	**I**	60(34.7)	113(65.3)	173(100)	0.56
	II	83(30.7)	187(69.3)	270(100)	
	Part I, Final Phase	**107(72.3)**	41(27.7)	148(100)	
	Part II, Final Phase	86(66.7)	43(33.3)	129(100)	
Quota of admission	**Govt**	127(29.5)	303(70.5)	430(100)	0.1
	Management	87(36.6)	151(63.4)	238(100)	
	NRI	**39(75)**	13(25)	52(100)	
Religion	**Hindu**	102(30.4)	234(69.6)	336(100)	0.76
	Muslim	**87(66.8)**	175(33.2)	262(100)	
	Christian	38(31.1)	84(68.9)	122(100)	

Cont... **Table I: Factors associated with depression**

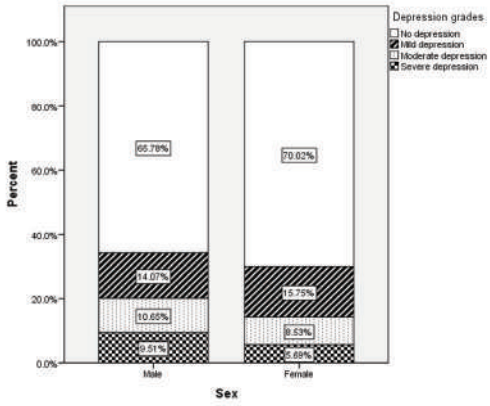
Place of origin	**Rural**	118(28.3)	299(71.7)	417(100)	**0.03**
	Urban	**109(36)**	194(64)	303(100)	
H/o major life event	**Present**	**107(57.2)**	143(42.8)	250(100)	**<0.01**
	Absent	120(25.5)	350(74.5)	470(100)	
H/o Chronic illness	**Present**	**14(37.8)**	23(62.2)	37(100)	0.40
	Absent	213(31.2)	470(68.8)	683(100)	
Feeling of Loneliness due to living away from home/ parents/siblings/ friends	**Present**	**88(44)**	112(56)	200(100)	**<0.01**
	Absent	139(26.7)	381(73.3)	520(100)	
Backlog in academics	**Present**	**64(41)**	92(59)	156(100)	**<0.01**
	Absent	163(28.9)	401(71.1)	564(100)	
H/o consumption of Alcohol	**Present**	**8(61.5)**	5(38.5)	13(100)	**0.019**
	Absent	219(31)	488(69)	707(100)	
H/o consumption of Tobacco	**Present**	**18(45.5)**	15(54.5)	33(100)	**<0.01**
	Absent	209(30.4)	478(69.6)	687(100)	



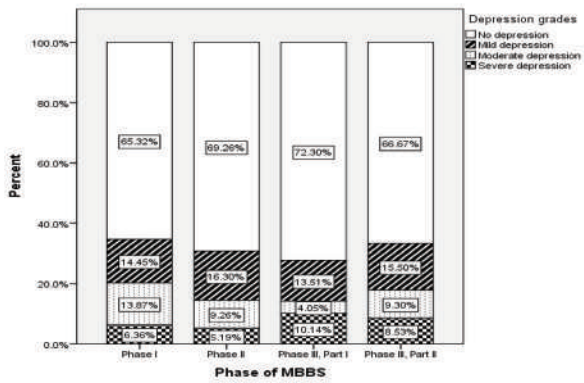
Graph 1: Distribution of different grades of depression among the study subjects



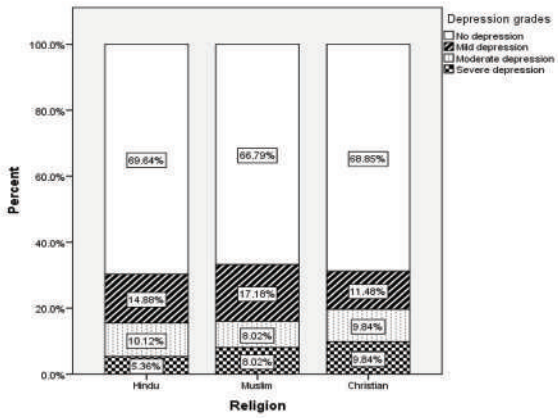
Graph 3: Stacked bar graph comparing grades of depression between different quotas of admission



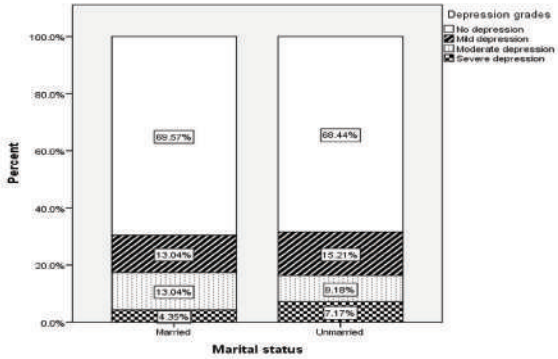
Graph 2: Stacked bar graph comparing grades of depression between sexes



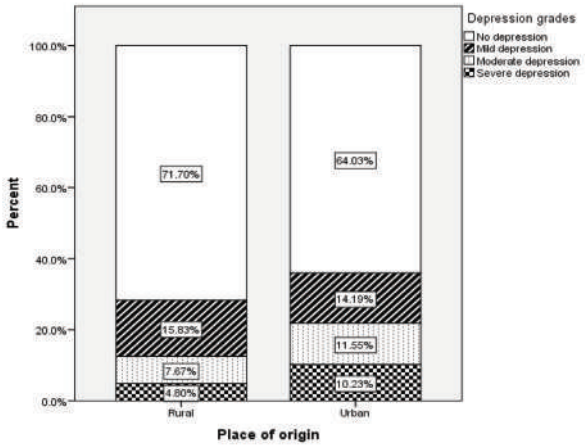
Graph 4: Stacked bar graph comparing grades of depression between students of different phases of MBBS



Graph 5: Stacked bar graph comparing grades of depression between students of different religions



Graph 6: Stacked bar graph comparing grades of depression between married and unmarried students



Graph 7: Stacked bar graph comparing grades of depression between rural and urban students

DISCUSSION

The prevalence of depression in our study was 31.5%. However, few other studies have reported a higher prevalence i.e., 58% and 44.4%. The differences could be due to the different questionnaires used (PHQ-9 in the former and older version of BDI in the latter) and the differences in the sociodemographic characteristics of the subjects. 15.1%, 9.3% and 7.1% subjects were found to have mild, moderate and severe depression respectively. Rawat et al., and Agrawal et al. have reported it as 43%, 12% and 3% and 44.42%, 27.12 and 0.98% respectively. The differences could be due to the reasons mentioned above.[14,15]

It was observed that the prevalence of depression was more among males compared to females, unmarried subjects compared to married, Part I-Final Phase students compared to other phases. Agrawal et al. have also reported the prevalence to be more among unmarried subjects compared to married. However, Agrawal et al., and Rawat et al., have reported the prevalence to be more among females compared to males and Phase II students and Phase I students respectively which is in contrast to our study.[14,15]

In the current study place of origin, h/o major life event, feeling of loneliness, backlog in academics and h/o consumption of tobacco and alcohol were found to have statistically significant association with depression whereas sex, marital status, Phase of MBBS and h/o chronic illness were not found to have statistically significant association. Ngasa et al., noted that the presence of a chronic disease, major life events, gender and being a student at the clinical level were found to have statistically significant association with depression whereas h/o consumption of alcohol was not found to have statistically significant association. These differences could be due to differences in the questionnaires used (Ngasa et al., have used PHQ-9 questionnaire) and also sociocultural differences between the subjects in the two studies.[16] Agrawal et al., have noted that gender, year of study and marital status were found to have statistically significant association with depression.[14]

The limitations of the study were that the study subjects were from a single college. Hence the findings cannot be generalized to the medical students' community of the country or world.

CONCLUSION

The Prevalence of depression in our study was lower compared to other studies. Urban origin, h/o major life event, feeling of loneliness, backlog in academics and h/o consumption of tobacco (at least once daily) and alcohol (> once a week) were found to be associated with presence of depression.

Conflict of Interest: None Declared

Source(S) of Funding: Nil

REFERENCES

1. Depression: a global public health concern. Geneva: WHO Department of Mental Health and Substance Abuse c2012-[cited 2018 Jan 22]. Available from: http://www.who.int/mental_health/management/depression/who_paper_depression_wfmh_2012.pdf
2. Moussavi S, Chatterji S, Verdes E, Tandon A, Patel V, Ustun B. Depression, chronic diseases, and decrements in health: Results from the world health surveys. The Lancet 2007; 370(9590):851–8.
3. Koochaki GM, Charkazi A, Hasanzadeh A, Saedani M, Qorbani M, Marjani A. Prevalence of stress among Iranian Medical Students: A questionnaire survey. East Medit health J 2011; 17(7):593–8.
4. Sherina MS, Rampal L, Kaneson N. Psychological stress among undergraduate medical students. Med J Malay. 2004; 59(2): 207–11.
5. Dyrbye LN, Thomas MR, Shanafelt TD. Systematic review of depression, anxiety, and other indicators of psychological distress among U.S. and Canadian Medical Students: J Assoc Amer Med Col. 2006; 81(4):354–73.
6. Bramness JG, Fixdal TC, Vaglum P. Effect of medical school stress on the mental health of medical students in early and late clinical curriculum. Acta Psychiatr Scand. 1991; 84(4):340–5.
7. Naidoo S, Van Wyk J, Higgins-Opitz SB, Moodley K. An evaluation of stress in Medical Students at a South African University. South African Fam Pract 2014; 56(5):258–62.
8. Fahrenkopf AM, Sectish TC, Barger LK, Sharek PJ, Lewin D, Chiang VW, et al. Rates of medication errors among depressed and burnt out residents: prospective cohort study. Brit Med J 2008; 336(7642): 488–91.
9. Frank E, Biola H, Burnett CA. Mortality rates and causes among U.S. physicians. Am J Prev Med 2000; 19(3):155–9.
10. Lindeman S, Laara E, Hakko H, Lonnqvist J. A systematic review on gender specific suicide mortality in medical doctors. The Brit J of Psychi 1996; 168(3):274–9.
11. Ibrahim MB, Abdelreheem MH. Prevalence of anxiety and depression among medical and pharmaceutical students in Alexandria University. Alexandr J of Med 2015; 51(2): 167–73.
12. Iqbal S, Gupta S, Venkatarao E. Stress, anxiety & depression among Medical Undergraduate Students & their socio-demographic correlates. Ind J Med Res 2015; 141(3): 354–7.
13. Saket PP. Effectiveness of Cognitive Behaviour Therapy in treatment of depression: a study of employed and unemployed downtrodden persons [dissertation].Sagar (MP): Dr. Hari Singh Gour Vishwavidyalaya; 2013.
14. Agrawal N, Sharma S, Meena R, Uppadhaya SK, Mittal M. Prevalence of Depression and its Associated Factors among Students of a Medical College in Western Rajasthan. Natl J Comm Med 2017; 8(1):12-16.
15. Rawat R, Kumar S, Manju L. Prevalence of depression and its associated factors among medical students of a private Medical College in South India. Int J Comm Med Pub Health 2016;3(6):1393-8.
16. Ngasa SN, Sama CB, Dzekem BS, Nforchu KN, Tindong M, Aroke D et al. Prevalence and factors associated with depression among medical students in Cameroon: a cross-sectional study. BMC Psychi2017; 17(216): 1-7.

Platelet-Rich Fibrin as Palatal Bandage: A Case Report

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ABSTRACT

Introduction: PRF [Plasma-rich fibrin] consists of numerous growth factors and platelet cytokines that promote faster wound healing. The use of PRF bandage on donor site in FGGs [free gingival graft procedures] can significantly reduce morbidity and accelerate healing. The aim of the presented case report is to document the contribution of PRF in the healing of FGG donor site.

Method and Material: PRF was prepared and compacted as a dressing on the palatal wound. Post-operative follow-up was done every week for 1 month.

Results and Discussion: It was observed that wound healing was superior and accelerated compared to conventional FGG. Complete wound healing was observed in 2 weeks. The patient reported minimal pain during first 2 days post-operatively.

Conclusion: Owing to the promising results delivered, a PRF palatal bandage is an efficacious method to safeguard the raw wound engendered as a result of FGG remarkably alleviating discomfort afflicted patients.

Keywords: *FGG, PRF, Donor site*

INTRODUCTION

FGG is a widely used procedure for the augmentation of keratinized tissues in the oral mucosa. [1] The root coverage provided by FGGs is similar to that of regenerative procedures and pedicle grafts however; FGGs offer superior gingival thickness which in turn helps in preventing recurrence of recession.[1] The graft is usually harvested from the palatal mucosa in the premolar-molar region.[2.,3] Being autogenous, the clinical outcome is far better than that of synthetic or allogenic grafts.[3] The primary disadvantage of this technique is the inevitable formation of two surgical sites and morbidity of the donor site. The palatal wound heals in 2-4 weeks by secondary intention relatively causing more pain and discomfort to the patient than connective tissue grafts[1,3]

To overcome this, the use of a bio-active material consisting of growth factors may be considered for accelerating healing of the donor site.[4] Platelet-rich fibrin, a second generation platelet concentrate stimulates angiogenesis, guided epithelial cell migration, development of an effective neovascularization resulting in accelerated tissue cicatrization, faster wound coverage and tissue remodeling.[4, 5] Moreover, fibrin and fibrin degradation products provide immunity by stimulating the migration of neutrophils and permitting their adhesion to endothelium and fibrinogen by increasing the membrane's expression of CD 11c/CD18 receptors[5]

This case report describes the clinical outcome of PRF used as a palatal bandage and the significant reduction in post-operative pain and inflammation, consequently reducing the donor site morbidity. An attempt has been made to relate and compare the palatal wound healing where FGG was done and wound closure was achieved with a non-eugenol pack.

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CASE REPORT

A systemically healthy male patient, aged 28 years was referred to the Department of Periodontology, Manipal college of dental sciences was evaluated for this case. Root coverage was indicated for lower left central incisor 31[Photoplate1]. 1 week ahead of surgery, the patient was advised for the following investigations- bleeding time, clotting time, hemoglobin count and platelet count, all of which were found to be within the normal range.

Surgical technique:

Prior to preparation, vitals of the patient were checked and found to be normal. Intra-oral asepsis was attained with 0.2% chlorhexidine digluconate solution and local anesthesia was administered. The receptor bed was prepared [Photoplate1] and a sterile template was used for measuring the dimensions of the graft, required for coverage.

Donor site:

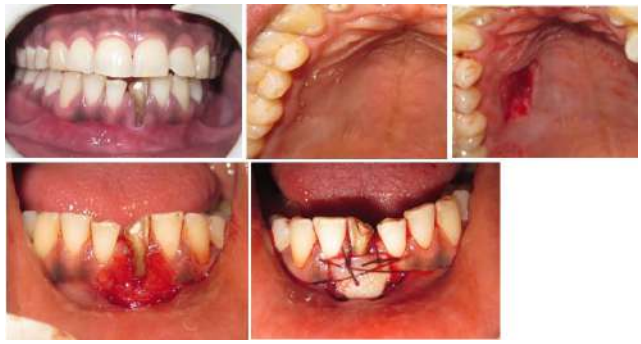
A split-thickness graft of the required dimensions was harvested by conventional scalpel technique from the palatal keratinized mucosa in the region around the premolars and the first molar. The bleeding was controlled by digital pressure. A sample of 10ml venous blood was collected from the antecubital vein, without any anti-coagulant and was immediately subjected to centrifugation at 3000rpm for 10 minutes as described by Choukron*et.al*.[5] A layer of fibrin formed in the tube between a layer of erythrocytes at the bottom and plasma poor plasma [PPP] at the top. Being a good hemostatic agent PPP was separated from the centrifuged blood using syringe and was applied on the palatal wound using gauze to control bleeding. The PRF was then emptied onto sterile gauze [Photoplate2] and squeezed to form a PRF membrane, which was resized to that of the palatal wound [Photoplate2]. The PRF was secured in place and the wound was closed by matrix suturing with 5-0, braided silk wire and placing a non-eugenol pack. Retention of the periodontal pack and protection of the donor site was aided by a sterile plastic stent.

Recipient site:

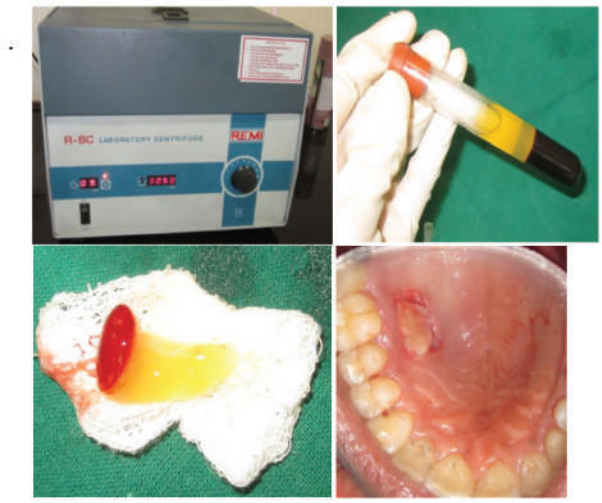
The FGG obtained was placed at the prepared recipient bed and sutured using 5-0, braided silk wire. [Photoplate1] A non-eugenol pack was placed over it. The patient was prescribed analgesics for 3days and chlorhexidine mouthwash for 2 weeks and recalled for suture removal after 1week and follow up was scheduled at intervals of 1week for 1month.

Clinical outcome

The patient was questioned if he faced any pain or discomfort at the donor site. According to the patient, discomfort was minimal, especially for first 2 days post-operatively. Palatal wound was then examined which revealed that the periodontal pack was intact and the palatal sutures were secure. After 10 days, the sutures were removed and the wound was further scrutinized. An uneventful superior healing was observed at the donor site that was visibly appreciable [Photoplate3.]. The wound had diminished in size and the margins showed no signs of inflammation, merging with normal tissues. Complete wound healing was observed in 2 weeks.

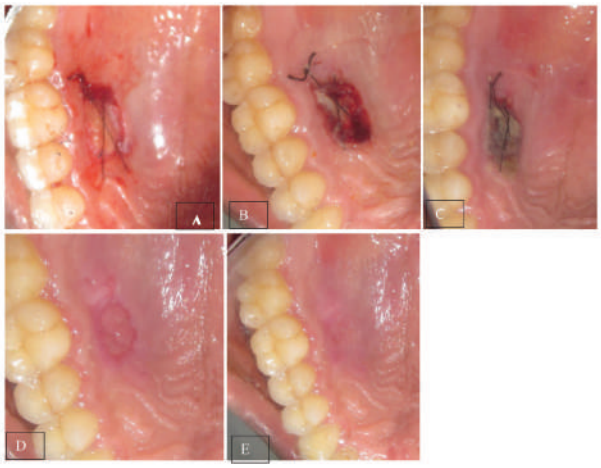


Photoplate1 Pre operative and Immediate Post Operative photographs of recipient and donor site



Photoplate 2. Preparation of Platelet-rich Fibrin and Donor Site Covered With PRF Membrane

Photoplate 3. From Clockwise Direction, Donor Site: A) On



The Day Of Surgery, B) Second Day Post-operatively C) Fourth Day Post-operatively D) 10th Day Post-operatively E) one month operatively

DISCUSSION

Free gingival grafts have been extensively used since their introduction by Bjorn in 1963.[6] The fate of the graft is largely dependent on the survival of the connective tissue at the recipient site. [7] Usually, sloughing of the epithelium is observed and sometimes, the graft, though healthy, is bulbous, and can be demarcated from the normal tissue. [7] Complete healing in FGGs is delayed and occurs by secondary intention, thus the graft is morphologically distinguishable from adjacent tissues for months.[3, 7] Moreover, donor site pain and morbidity was much longer and greater, making it less preferable for root coverage procedures.[3]

The use of PRF as palatal bandage was first advocated by Aravindaksha et al. [2] as an efficacious approach to protect the raw wound area of palatal donor site to reduce healing time and patient discomfort. PRF is known to improve body's natural defense mechanism and promote healing and regeneration of tissues. Being strictly autologous, it is advantageous over the conventional PRP as it eliminates the need for biochemical handling of blood.[8] Additionally, preparation of PRF is inexpensive and eliminates the risks related to toxenogenous [bovine] derived thrombin.[4] However, the preparation of PRF is technique sensitive as it involves immediate collection of blood and centrifugation, prior to initiation of clotting cascade.

The triad of angiogenesis, immunity and formation of epithelial cover are substantiated by PRF.[5] PRF comprises of fibrin that binds to several growth factors like, fibroblast growth factor, platelet derived growth factor, vascular endothelial growth factor and angiopoietin which play an important role in initial angiogenesis. The molecular structure of fibrin serves as an optimal matrix that supports proliferation of fibroblasts and endothelial cells, allowing rapid angiogenesis.[5] PRF is considered to be an immune organizing node, owing to its rich content in cytokines that possess chemotactic properties and facilitate neovascularization.[9] These cytokines are gradually released from the PRF during fibrin matrix remodeling that favors wound healing.[9] Rasmus*et et al.*[10] postulated that the fibrin matrix promotes synthesis of Type I collagen and protects endogenous fibrogenic factors from proteolytic degradation, forming a physiologic architecture conducive to wound healing.

In the present case, excellent healing was achieved within 14 days. The graft was pink, firm and merged with the surrounding tissues. Signs of inflammation or infection were not seen. The reason for accelerated and superior degree of healing may be attributed to the use of PRF as a palatal bandage.

CONCLUSION

PRF as an adjuvant has succeeded in mitigating post-operative pain and morbidity of the donor site. Using it as a bio-active dressing is time-saving and cost-effective. From a clinical standpoint, PRF promotes all the imperative parameters associated with wound healing and further implications of this novel technique in periodontal surgeries need to be elucidated.

Ethical Clearance- Ethical committee approval was taken prior to the publication from institutional ethical and research committee Manipal College of Dental Sciences, Mangalore, Manipal College of Higher education.(MAHE)

Source of Funding- Self.

Conflict of Interest – Nil

REFERENCES

1. Beatrice Femminella, Maria Chiara Iaconi, Marcella Di Tullio, Luigi Romano, Bruna Sinjari, Camillo D'Arcangelo, Paolo De Ninis, Michele Paolantonio. Clinical Comparison of Platelet Rich Fibrin and a Gelatin Sponge in the Management of Palatal Wounds Following Epithelialized Free Gingival Graft Harvest : A Randomized Clinical

Trial. Journal of Periodontology 87[2]:1-17 • August 2015

2. ShyamPrasad Aravindaksha,Puneet Batra, Vishal Sood,Ashish Kumar and Geeti Gupta. Use of Platelet Rich Fibrin [PRF] Membrane as Palatal Bandage. 2013;1–12.
3. Kulkarni MR, Thomas BS, Varghese JM. Platelet rich fibrin as an adjunct to palatal wound healing after harvesting a free gingival graft : A case series. 2014;18[3]:2014–7.
4. Thorat MK, Pradeep AR, Pallavi B.. Clinical effect of autologous platelet-rich fibrin in the treatment of intra-bony defects : a controlled clinical trial. 2011;[1923]:925–32.
5. Choukroun J, Diss A, Simonpieri A, Dohan AJJ, Mouhyi J, Dohan DM. Platelet-rich fibrin [PRF]: A second-generation platelet concentrate . Part IV : Clinical effects on tissue healing. 2006;56–60.
6. Bjorn H. Free transplantation of gingiva propria. Sven Tandlak Tidskr. 1963;22:684–689.
7. Newman, Michael G., Henry H. Takei, and Fermin A. Carranza. Carranza's Clinical Periodontology. Philadelphia: W.B. Saunders Co, 2002.
8. Sunitha Raja V, Munirathnam Naidu E. Platelet-rich fibrin : Evolution of a second-generation platelet concentrate. Indian J Dent Res. 2008 Jan-Mar;19[1]:42-6.
9. Dohan DM, Choukroun J, Diss A, Dohan SL, Dohan AJJ, Mouhyi J, et al. Platelet-rich fibrin [PRF]: A second-generation platelet concentrate . Part III : Leucocyte activation : A new feature for platelet concentrates ? Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2006 Mar;101 [3]:e51-5.
10. Lundquist R, Dziegiel MH. Bioactivity and stability of endogenous fibrogenic factors in platelet-rich fibrin. Wound Repair Regen. 2008 May-Jun;16[3]:356-63.

The Exemplar of Employment Epoch in India with HRD Perspective

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ABSTRACT

The term human resource means the total sum of competencies in the society. The development of an economy depends on all competencies of Human resources. In present day context, the human resource development gains importance as it shapes development strategies of nations in global context. The hotplate of recent economy issue is the employment factor and in turn manpower development of the respective country. The developed countries are free from the problem of unemployment but suffering from, disguised unemployment and underemployment. The current study focuses on market mechanisms, by employing new strategies in the present academic system through matching education and training to augment the need for human resources. The basic objective of present study to induce the Tamilnadu government intensify efforts so as to increase public as well as private investment and spending on key Social Services, such as Education system, Social welfare measures, Proper Nutrition, sufficient irrigation facility, Adequate and clean sanitation Public health and Family Welfare etc., Chapter one provides basic idea about the Human resource development and Employment. Chapter two displays the methodology of the study. Chapter three lists the review of literature. Chapter four describes the share of employment in all three sectors and corresponding industrial break up with projection of the share of employment in developed countries. Chapter six describes the same for developing countries. The last chapter concludes with the findings and suggestions.

***Keywords**: HRD, Employment, Economic Development, Labour, Sectors*

INTRODUCTION

The human resources has crossed it territory of significance from personnel department to Administrative level and policy framework. The performance of production intended to verbal evolution of human resource development. Human beings are an asset who must be hired, satisfied, developed, and retained in current scenario. In long run, like financial assets and materials assets, even human assets also be maintained and replaced based the demand of the commercial world. In the line of organization human resources attains the higher grade as it sustain the feasibility of business policy in the reality. The human resources development are not restricted with the formal approaches such as class room training, hands on courses or preplanned training programme, but also extended to informal way by means conversation, coaching by manager, project proposal and presentation. Healthy organizations are adopting both formal and informal bases for the development of human resource development. The dictionary meaning of human resources, 'the people, staff or person who operates and maintains the organization which is contrasted from other assets like physical, financial, monetary and material assets'. Human Resource is a process implemented in an organization which deals with the people and issues related to people such as reward, appointment, recompense, routine management, and training. The growth of human resources in the recent past has witness the level of reaps and bounds of development of business practices and it becomes integral part of the organization.

METHODOLOGY

Hypothesis

Human resource development influences the mental and physical conditions of the employee.

Human resource development improves labour working days.

OBJECTIVES OF STUDY

To analyze the role of human resources development in growth of Indian economy.

To prove the HRD meant for the right person is in the right place at the right time.

To construct a framework for employees to improve personal and technical skills, knowledge, and abilities.

REVIEW OF LITERATURE

According to India Labour and Employment report 2014[1], the structure of the labour market, patterns of employment growth, and labour-market institutions play an important role in shaping development patterns and outcomes. However, there is a lack of analytical documentation on these issues.

Amitabh Kundu and P.C. Mohanan[2] According to them, the trends and pattern of economic growth does not guarantee that the growth of job opportunities will be equal to that of the working age population or higher than that, after wiping out the backlog of umemployment.

T.S Pabola and Partha Pratim Sahu[3], According to them, a major proportion of workers in non-agriculture economic activities work in informal sector where they suffer from a large quality deficit in employment, in terms of low productivity, low earnings, poor conditions of work and lack of social protection.

IMA report[4] has analyzed and prepared a report on the India employment Report, the employment during 2015-16. In this report, they compared the employment with talent scenario in India. During the this period nearly 462.5 million people above the age of 14 years were employed, and it is more than 9 million, a decade ago. It is unforturnate that nearly 18 million were searching for jobs. The number of people has increased by about 91 million between 1999-00 and 2015-16. However, both number of people employed and their share in the total population have decre3ased streadily in the last four years. Between 1999-00 and 2015-16, about 1.5 times more people were employed in the urban areas than in rural areas. The urban workforce increased at a much faster rate 3.3 percent CAGR compared to 0.8 percent of rural work force. The rate of rural employment declined frm 3.5 times urban employment in 2004-05 to 2.4 times in 2015-16.

Sona Mitra[5] According to her, proportional employment generation has not been achieved along with incremental output growth rate and secondly employment opportunities have negative growth with the traditional labour intensive industries.

HRD and Management Development

The strength of human resource development depends on the management and leadership development process which is flexible and continuous, linking an individual's development to the goals of the task available in the organization. The correlation between the level of employment and economic activity, witness a positive response from the worldwide statistics. Table 1 depicts the share of employment from the primary, secondary and tertiary sector with respect to economic activity, extracted from world development Indicators for the year 2011 to developed countries.

Table 1: Share of Employment by Economic Activity (%) year 2011

Country	Agriculture	Industry	Service
UK	1.5	23.5	75.0
USA	2.0	22.0	76.0
France	1.5	23.5	75.0
Japan	5.0	29.0	65.0
Germany	2.5	31.0	66.0
Italy	5.5	29.5	65.0
Australia	4.5	20.0	75.5

Source: World Development Indicators (WDI): 2011[6]

The above table indicates, the elasticity of employment in the developed countries significantly differs across the sectors. As a matter of fact, there is no provision for further employment irrespective of output. Except pure agriculture, the scope for the employment is almost zero and the value of elasticity in service sector ranges from 0.3 to 0.5. However, there is a space for the overall employment level, for the agro based industries and core manufacturing industries for service sector in

large base. From our projections, it is seen that even if the service sector grows at more than 10 per cent, its share in employment by 2013 will still be only 29 percent rising from the level of 23 per cent in 1999-2000.

Table 2: Employment Projections (at % growth rate)

	1999-2000	2004-05	Projected Elasticity	Growth Rate	Employment Growth rate	2017
Agriculture	237.56	240.32	0.10	4.00	0.40	252.11
Mining& quarrying	2.27	2.24	0.00	4.70	0.00	2.24
Manufacturing	48.01	51.79	0.22	10.50	2.31	68.11
Electricity, Gas and water supply	1.28	1.29	0.00	8.30	0.00	1.29
Construction	17.62	21.10	0.60	8.50	5.10	38.32
Trade, hotels& restaurant	37.32	45.76	0.50	9.20	4.60	78.49
Transport, Storage and communication	14.69	18.78	0.40	10.50	4.20	30.76
Financing, insurance, real estates and business services	5.05	5.90	0.50	11.00	5.50	11.21
Community, social and personal services	33.20	35.95	0.30	7.60	2.28	47.11
Total Employment	397.00	423.13	0.22	8.00	1.76	529.64
Labour Force (1.5%)	406.05	437.43				522.99
Labour Force (1.8%)	406.05	443.93				549.90
Unemployment rate (1.8%)	2.23					3.68

Source: Planning Commission: 2016

From table 2, it is evident that fast-tracking growth is dominant in all economic activities to expanding employment opportunities. The need of the hour arises to support and enhance both demand and supply sides of the human resources in order to achieve new heights of employment. On the demand side the most compelling force is evident for growth in the employment. The estimates are projecting a sustained growth of 8.5 per cent per annum, by 2015, and unemployment will be totally eliminated. The macroeconomic policy framework may facilitate accelerated growth in the economy. Secondly, demand side strategy envisioned with specific policies for selective sectors aimed at the growth of labour intensive industries like appeal industry, leather industry and textile industry. This must be managed in such a way that there is no compromise with efficiency. The supply side interventions should be in capacity building and enhancing the skill endowment of the labour force.

The following table portrays the share of employment by economic activity for the South East Asian countries for the year 2011.

Table: 3 Share of Employment by Economic Activity (%) Year 2011

Country	Agriculture	Industry	Service
China	49.8	23.5	26.7
Indonesia	55.5	14.0	31.0
Thailand	49.0	18.5	32.5
Philippines	35.0	15.0	50.0
Malaysia	17.5	31.5	51.0
Korea Rep.	10.5	26.5	55.5
Pakistan	58.5	14.5	27.0
India	57.0	21.0	22.0

Sources: World Development Indicators (WDI): 2011

It is acknowledged from Table 3 that discussion of the employment situation or an employment strategy will not be complete without a reference to the social safety nets for workers. The organized sector of the society represents the social secured sector which are lacking in the developed countries like India.

Table 4: Rate of Growth of Population, Labour Force and Employment: 2011

Time intervels	Population growth (% per annum)	Labour force (% per annum)	Employment Groqwth (% per annum)	Gross Domestic Product growth (% per annum)
1972-73 - 1977-78	2.27	2.94	2.73	4.70
1977-78 to 1983	2.19	2.04	2.17	4.05
1983 to 1987-88	2.14	1.74	1.54	4.23
1987-88 to1993-94	2.10	2.29	2.43	5.85
(1983 to 1993-94)	(2.12)	(2.05)	(2.04)	(5.20)
1993-94 to 1999-2000	1.93	1.03	0.98	6.63
1999-2000 to 2010-2011	1.21	1.73	1.27	5.21

Source: Report of Task force Employment Opportunities, Planning Commission:[7]

The essence of the study is to compare the employment with the economic activity for which the growth rate of population, labour force and employment are compared with the Gross Domestic Product with their growth rate. Surprisingly there is a positive linkage between employment and the GDP, and also other Economic indicators.

CONCLUSION

From the current study, it can be reviewed that employment opportunity are to be generated through the effective human resource management. Unless and otherwise, it is difficult to enhance the production policy and other industrial policy. The main suggestion of the study is the rural industrialization through available human resource the backward, semi-urban and remote areas. The labour intensive industries are encouraged to implement the human resource policy in order to create more employment opportunities. The may pave way for equality in the developmental activities as well as utilization of available human resources in optimum way.

Ethical Clearance: completed. (Dept. level committee at VELS)

Source of Funding: Self

Conflict of Interest: NIL

REFERENCES

1. Report on "India Labour and Employment report 2014" – Institute for Human development, www.ihdindia.org
2. Amitabh Kundu and P.C. Mohanan, "Employment and inequality outcomes in India, 2010. http://www.oecd.org/employment/
3. T.S. Pabola and Partha Pratim Sahu, "Growth and structure of employment in India, - Long term and post reform performance and emerging challenges" - Institute for studies in industrial development, New Delhi, 2012.
4. NSSO, labour bureau, IMA analysis, India employment report 2016,. www.ima-india.com
5. Sona Mitra, Changes in employment pattern upon urban women workers in India
6. Report on World Development Indicators – 2011
7. Planning Commission record – 'Report of Task force Employment Opportunities' 2011

Effectiveness of Structured Teaching Programme on Knowledge of Kangaroo Mother Care among Mothers

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ABSTRACT

Objective : The objective of the study was to find out the efficacy of structured teaching programme (STP) of Kangaroo Mother Care (KMC) among mothers in AIMS, Kochi. **Materials and method:** A quantitative approach with quasi experimental pretest – posttest design and convenience sampling technique ws used in this study. Study was conducted on 100 antenatal mothers' (50 experimental and 50 control group) attending gynecologic OPD, AIMS , Kochi, Kerala. The tools used for the study was Knowledge Questionnaire on KMC with 13 items related to demographic data and 17 items related to KMC. **Result :** The present study reveals that out 50 subjects of experimental group, the mean pretest knowledge score is 7. 4 and the mean posttest knowledge score is 10.5 after the implementation of Structured Teaching Programme (STP). The control group, mean pretest knowledge score is 8.2 and the mean posttest knowledge score is 6.9. There is high level of significance in the knowledge score of the subjects between the experimental and control group at ($t(98) = 2.62$,$p<0.000$).The pretest and post test knowledge score was greater in primigravida mothers than multi gravida mothers .A statistically significant association was observed for educational level and knowledge score (f 17.56 ,$p<0.05$), prior information and knowledge score (f 8.369,$p<0.05$). **Conclusion:** Based on the study findings the STP was significantly effective to improve the knowledge level of mothers' regarding the KMC. Majority of the mothers' 35 (68%) had inadequate knowledge regarding KMC before the implementation of the STP and after the implementation 37 (74%) attained adequate knowledge.

Keywords : *Structured Teaching Programme , Kangaroo Mother Care , Knowledge, Mothers*

INTRODUCTION

Kangaroo care seeks to provide restored closeness of the new born with family members by placing the infant in direct skin –to-skin contact with them. This ensures physiological and psychological warmth and bonding. The parent's stable body temperature is more smoothly than an incubator, and allows for readily accessible breast feeding when the mother holds the baby this way .While this model of infant care is substantially different from the typical western neonatal intensive care unit. It is estimated more than 200 neonatal intensive care units practice kangaroo care today. One recent survey found that 82%of neonatal intensive care units use kangaroo care in the States today[1].

Caring low birth weight baby is a great challenge for the neonatal care unit and the family. Number of low birth weight baby is still far beyond the expected target in our country. The cost of the quality management of these babies is increasing day by day . KMC is low cost approach for the care of low birth weight baby. This method of care was introduced and popularized by Dr. Edger Roy, Dr .Martinez and Dr. Charpak in late 1970's[2].

Sivapriya S, Subash J, Kamala S. (2008) conducted a quasi experimental study to assess the knowledge of mothers of preterm babies regarding kangaroo mother care and to evaluate the effectiveness of structured teaching programme on kangaroo care among the mothers of preterm babies. A total of 35 mothers were

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selected for the study. Findings of the study revealed that, the pre-test knowledge of the Kangaroo Care was Nil. After the structured teaching programmepost test knowledge of the mother regarding Kangaroo Care was increased. 6 (17.10%) mothers had inadequate knowledge on Kangaroo Care, 25 (71.4%) mothers had moderately adequate knowledge and 4 (11.5%) mothers had adequate knowledge on Kangaroo Care. Kangaroo Mother Care is a simple low cost and highly effective intervention for low birth weight babies. And also teaching programmes can improve the knowledge of mothers on Kangaroo Care. So, educational programme on Kangaroo Care can be provided to Mothers, which in turn will improve the preterm and low birth care [3].

Preterm birth is now the leading cause of under-five child deaths worldwide with one million direct deaths plus approximately another million where preterm is a risk factor for neonatal deaths due to other causes. There is strong evidence that kangaroo mother care (KMC) reduces mortality among babies with birth weight <2000 g (mostly preterm). KMC involves continuous skin-to-skin contact, breastfeeding support, and promotion of early hospital discharge with follow-up. The World Health Organization has endorsed KMC for stabilised newborns in health facilities in both high-income and low- income countries [4]. The study will initiate key steps in the development, implementation and expansion of sustainable, facility-based KMC services in the institution and thereby in all developing countries.

AIMS AND OBJECTIVES

The aim of the study was to find out the efficacy of structured teaching programme of KMC among mothers in AIMS, Kochi

1) Identify the pretest and post test knowledge score on KMC among mothers'of experimental group

2) Evaluate pretest and posttest level of knowledge score among mothers' control group

3) Compare the post test level of knowledge score among primi and multipara mothers'

4) Find the association between the selected demographic variables and knowledge level on KMC among mothers'

HYPOTHESIS

H1:There will be significant difference in the posttest knowledge score after the administration of the STP the experimental group.

H2: There is significant association between the post test knowledge score and the selected demographic variables .

VARIABLE

Independent Variable : STP regarding KMC

Dependent Variable : Knowledge of mothers'

MATERIALS AND METHOD

The study was conducted on 100 antenatal mothers and the research approach is quantitative and research design used was quasi experimental pretest – posttest .The researcher explained the purpose of study and obtained an informed consent and the tool was administered and the data was obtained from the mothers .The tools used for the study was Knowledge Questionnaire on KMC with 13 items related to demographic data and 17 items related to KMC. Each mother took nearly 20 minutes to take fill the questionnaire .The data obtained was analyzed using inferential and descriptive statistics i.e independent and paired' t' test. and Chi square .

DATA COLLECTION INSTRUMENTS

Tool 1: Knowledge Questionnaire on KMC.

Part I Demographic Performa

The semi structured questionnaire was with 13 items related to demographic data-age , marital status ,education ,occupation area of residence, ,number of delivery , number of children, birth weight ,mode of delivery ,number of pregnancy, prior information, prior practice of KMC

Part II Knowledge questionnaire

17 items related to KMC with four options out of which one answer is the most appropriate which is graded as one and the wrong answer with zero.

RESULTS AND DISCUSSION

Section 1 : Socio demographic characteristics of subjects

Table 1 : Distribution of subjects based on demographic variables. n = 100

Sl no.	Sample characteristics	Frequency (f)	Percentage (%)
1	**Age in years** 18- 25	49	49 %
	26-32	46	46 %
	33-40	5	5 %
	Above 40	-	-
2	**Education** Primary school	15	15 %
	Secondary school	27	27 %
	Graduate	46	46 %
	Postgraduate/above	12	12 %
3	**Occupation** Homemaker	62	62 %
	Government employee	6	6 %
	Private employee	32	32 %
	Business	-	-

Table 1 depicts most of the mothers 49(49%) falls in the age group between 18-25 ,46(46%) of the mothers were graduates ,62(62%) of the mothers were homemakers ,59(59%) of the mothers were primi gravida and 66(66%) of the mothers did not have any prior information about KMC .

n = 100

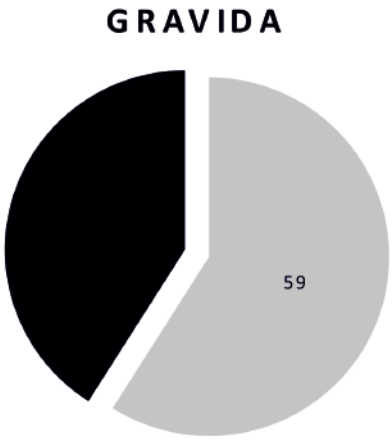

Figure 1: Distribution of subjects according to gravida

Data presented in figure 1 shows that out of 100 mothers 59(59%) of the mothers are primi gravida and 41(41%) are multigravida.

n = 100

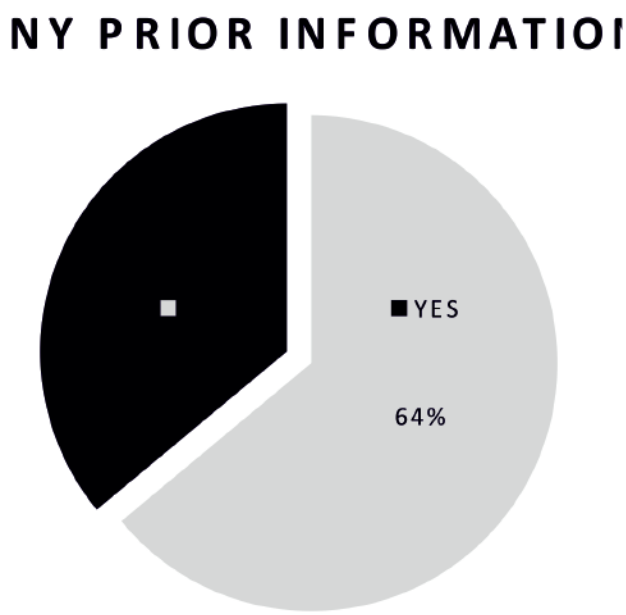

Figure 2: Distribution of subjects according to any prior information

Data presented in figure 2 shows the frequency and percentage of mothers according to any prior information on KMC . Among 100 mothers 64 (64%) of the mothers have no information on KMC and 36(36%) are having informations on KMC .

Section II: Analysis of pre & post test knowledge score of the mothers

Table II – Distribution of samples according to pre –test knowledge score of experimental group

n = 50

Pre test score experimental group		
Level of knowledge	**Frequency (f)**	**Percentage (%)**
Adequate knowledge ≥13	0	0 %
Moderate knowledge 9-12	16	32 %
Inadequate knowledge ≤8	34	68 %

The data presented on table 2 shows that out of 50 mothers 16(32%) of mothers have moderate knowledge, 34(68%) has inadequate knowledge before the implementation of STP on KMC

Table III – Distribution of samples according to post –test knowledge score of experimental group

n=50

Post test score experimental group		
Level of knowledge	**Frequency (f)**	**Percentage (%)**
Adequate knowledge ≥13	6	12 %
Moderate knowledge 9-12	37	74 %
Inadequate knowledge ≤8	7	14 %

The data presented on table III shows that out of 50 samples 6(12%) samples have gained adequate knowledge ,37(74%) of sample has attained gained moderate knowledge and 7(14%) have inadequate knowledge after the implementation of STP.

Section III: Comparison the pre test and post test level of knowledge score of experimental and control group

Table IV – Distribution of samples according to mean ,standard deviation ,mean difference and 't' value of the experimental group n = 50

	Knowledge		**mean difference**	**t-value**	**df**	**level of significance**
EXPERIMENTAL GROUP	Mean	SD				
Pre test	7.40	1.714	. 115			
Post test	10.50	1.854	.123	11.964	49	.000

(t (49)= 3.269,p(.000))

The data presented in table IV shows that there is a significant difference in the knowledge score of the subjects within the group after the intervention.

(n=100)

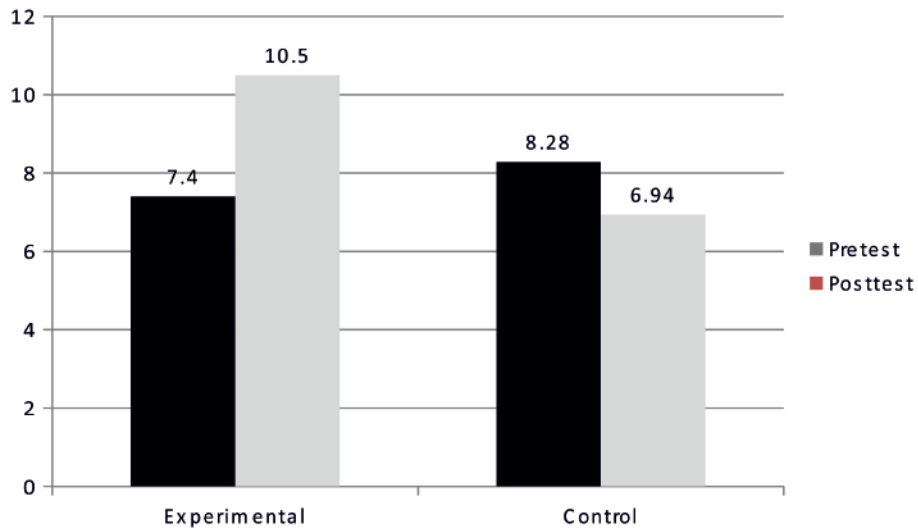

Figure 3: The mean pre test and post test knowledge scores

Figure 3 indicate that the mean knowledge score of the experimental group pre test is 7.4 and the mean post test score is 10.5 after the implementation of the intervention and the mean knowledge score of the control group pre test is 8.2 and the post test is 6.

Table V – Comparison of posttest between the experimental and control group n= 100

	Knowledge		**mean difference**	**t-value**	**df**	**level of significance**
EXPERIMENTAL GROUP Post test	Mean	SD	0.123	8.369	98	.000
	10.50	1.854				
CONTROL GROUP Post test	6.94	2.368	0 .73			

(t (98) =2.62 ,p<0.000)

The data presented in table V shows that there is high level of significance in the knowledge score of the subjects between the experimental and control group.

Section IV- Association between knowledge level of subjects and selected demographic variables

Table VI – Association between education and pretest knowledge score n= 100

Variable	**Level of Knowledge**			**df**	χ^2	**p-value**
Education	inadequate	moderate	adequate	6	17.536	0.008
Graduate	28	21	0			
Postgraduate	3	8	1			
Primary school	13	2	0			
Secondary school	18	9	0			

Table VI reveals that there is significant association between education and level of education at (χ^2-17.536,p<0.05)

DISCUSSION

Out of 50 samples of experimental group 16(32%) of the sample had moderate knowledge,34(68%) had inadequate knowledge , before the administration of STP.

Out of 50 samples of experimental group37 (74%) of the sample gained moderate knowledge,7(14%) are still having inadequate knowledge and 6 (12%) samples are having adequate knowledge after the administration of STP.

The mean pre test knowledge score is 7.40 and post test knowledge score is 10.50of the experimental group. And the mean pre test knowledge score is 8.28 and post test knowledge score is 6.94 of the control group. Statistical analysis of data shows mean post test knowledge score was 10.50 which is higher than the mean pre test knowledge score was 7.40. There is 3.1 mean increase in the knowledge .

There is high level of significance in the knowledge score of the subjects between the experimental and control group at (t (98) =2.62 ,p<0.000).

Sivapriya S, Subash J, Kamala S. (2008) conducted a quasi experimental study to assess the knowledge of mothers of preterm babies regarding kangaroo mother care and to evaluate the effectiveness of structured teaching programme on kangaroo care among the mothers of preterm babies. After the structured teaching programme post test knowledge of the mother regarding Kangaroo Care was increased. 6 (17.10%) mothers had

inadequate knowledge on Kangaroo Care, 25 (71.4%) mothers had moderately adequate knowledge and 4 (11.5%) mothers had adequate knowledge on Kangaroo Care.[3]

The findings of the present study correlates with the findings of the supportive study . Hence STP can be considered as an important teaching method to impart knowledge

CONCLUSION

KMC is a powerful, easy method to use and to promote the health and wellbeing of low birth weight babies. KMC helps in maintaining temperature of infant; facilities breast feeding; improves growth; reduces infection; and improves mother-infant bonding.[4] Many Mothers in India does not know how to practice KMC on their low birth weight babies and hence they do not practice also. So, to know the current knowledge and attitude of mothers regarding KMC and to improve their knowledge and practice some research studies are needed to carried on with teaching programmes on mothers of low birth weight babies. In turns it also helps the nursing personnel to improve their communication skills.[5]

Conflict of Interest: There Is No Conflict Of Interest.

Financial Support: Nil

Ethical Clearence: Obtained from Research committee of Amrita College of Nursing and Institutional Ethics Committee of Amrita Institute of Medical Sciences, Kochi.

REFERENCES

1. Ludington H S, Lewis T, Morgan K, Cong X, Anderson L, & Reese S. Breast and infant temperatures with twins during shared kangaroo care, Journal of Obstetrics, Gynecologic, and Neonatal Nursing 2006; 35 (2), 223-231 Available from URL: https://en.wikipedia.org/wiki/Kangaroo_care
2. Parul Datta . Text Book of Pediatrics Nursing.2nd edition. Jaypee brothers' medical publishers; 2007. p.109-133.
3. Sivapriya S, Subash J, Kamala S. Effectiveness of a structured teaching programme on Kangaroo Care among the mothers of preterm babies, Prism's Nursing Practice 2008 ; Jan 1; 2(4). p. 11-13.
4. World Health Organization. Kangaroo mother care saves low birth weight babies: Evidenced Based Technique, WHO, Geneva; March 04, 2011.
5. Ghai OP. Essential of Pediatrics. 6th ed. Delhi. Dr. O.P Ghai Publications; 2005. p. 153.
6. Remya R R V . Effectiveness of structured teaching programme regarding infertility on degree students in selected colleges in Bangalore in view to develop an information booklet .[online] Available fromURL :http://www.rguhs.ac.in/cdc/onlinecdc/uploads/05_N001_8171.doc.

Indoor Air Pollution an Ignored Public Health Issue: Study to Find the Awareness and Practices Regarding Indoor Air Pollution in a Rural Setting Near Chennai

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ABSTRACT

Background: Indoor air pollution (IAP) refers to chemical, biological and physical contamination of indoor air. It is of great concern owing to the range of ill effects it has on health. Rural India still relies on biomass fuels for cooking inspite of availability of cleaner fuels.

Objective: To assess the knowledge, and practices regarding indoor air pollution and its health hazards among rural women in Kuthambakkam village in Tamilnadu.

Methodology: A cross sectional descriptive study was conducted among rural women from 150 households in Kuthambakam village in Tamilnadu. Personal interviews were conducted at their houses using a structured questionnaire. Data obtained was analyzed using SPSS version 21.

Results: The mean age of the study participants was 38.5 years. Majority of the women were married (90.7%) or widowed (2.6%). 13.3% were illiterates. Overcrowding was found to be present in 46% households. Kitchen was not separate in 42.7% houses. Majority households used LPG (70%) as source of cooking fuel followed by wood (18%), kerosene (11.3%) and cow dung (0.7%). 4% of the houses did not have any windows in the kitchen while in remaining houses windows (64.7%) were the common mode of exhaust for smoke. The practice of burning mosquito coils and incense sticks was seen in 37.3% and 46% households respectively. The study found that 16 (38%) men smoked inside their houses. 57% women were not aware that indoor air pollution is hazardous to their health and well being.

Conclusion: Indoor air pollution is a looming threat often ignored by people. It is imperative to make people aware of indoor air pollution and its deleterious effects on human health.

Keywords: *Biomass fuel, Health, Ignorance, Indoor air pollution*

INTRODUCTION

Indoor air pollution (IAP) refers to chemical, biological and physical contamination of indoor air.[1]It is of great concern owing to the range of ill effects it has on health. Globally, IAP from use of solid fuel accounts for more than 1.6 million deaths and 39 million DALYs every year.[2] Approximately, three billion people in the world, use biomass such as crop residues, dung, straw, wood, kerosene and coal as their primary source of energy for cooking and heating. In the South East Asia region, 78% households rely on solid fuel for cooking. IAP was estimated to cause 374000 deaths in children below 5 years & 185000 deaths among adults. India is the main victim and IAP is estimated to be responsible for between 4% to 6% of the national burden of disease.[2] A majority of these households are located in poor rural

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communities and burn such solid fuels in inefficient devices, often in kitchens that are poorly ventilated, resulting in very high exposures to multiple toxic products of incomplete combustion.[3]

According to WHO, a pollutant released indoors is 1000 times more likely to reach the lung than that released outdoors. Biomass smoke contains harmful pollutants like suspended particulate matter, nitrogen dioxide (NO2), carbon monoxide, sulphur dioxide (SO2), formaldehyde and carcinogens. Indoor smoking of tobacco also contributes to IAP. Studies both in India and other countries have confirmed that exposure to biomass fuels has a significant association to chronic respiratory symptoms such as chronic cough, chronic phlegm and chronic respiratory diseases such as chronic bronchitis, asthma, corpulmonale and respiratory failure.[2-5]

According to the Census of India (2011), many households still rely on firewood fuel for cooking and approximately 20% rely on other forms of biomass fuels. In rural areas, approximately 80-90% of households are dependent on biomass for cooking. In contrast to cleaner fuels, kerosene and LPG were accounted for 19% and 48%, respectively.[6] Poverty, inaccessibility to improved cooking fuel, and lack of awareness about harms of biomass emissions are among the major factors that drive their widespread use.[7] In India, out of 0.2 billion people using fuel for cooking; 49% use firewood; 8.9% cow dung cake; 1.5% coal, lignite, or charcoal; 2.9% kerosene; 28.6% liquefied petroleum gas (LPG); 0.1% electricity; 0.4% biogas; and 0.5% any other means.[8]

A person's exposure to indoor air pollution is determined by the concentration of pollutants in the indoor environment and by the amount of time spent in this environment. Stove features (the presence of chimney or flue that routes smoke to the outside), the location of the stove and kitchen, as well as ventilation practices have a major impact on indoor air pollution. In most societies women are in charge of cooking and they spend between 3 and 7 hours per day near the stove preparing food.[2]It is estimated that an average woman in India may be subjected to 60,000 hours of exposure to smoke due to combustion of biomass fuels in her life time.[5] Being the most vulnerable group, the present study was conducted among rural women in Kuthambakkam village in Tamilnadu.

OBJECTIVE

To assess the knowledge, and practices regarding indoor air pollution and its health hazards among rural women in Kuthambakkam village in Tamilnadu.

METHODOLOGY

It was a cross sectional descriptive study conducted between January - February 2016 in Kuthambakkam village, the rural field practice area of Saveetha Medical College and Hospital, Thandalam. Permission was obtained from the Institutional Ethics Committee prior to the conduct of study.

According to NFHS 4, 73% of households use clean fuel for cooking in India. Based on this prevalence and taking relative precision as 10% of prevalence, at 95% confidence level the sample size was calculated as 142. So for the present study it was decided to survey 150 households. Kuthambakkam village is located 30 Km away from Chennai and has a population of 5047 people and 1277 households.[6] The required number of households was selected using simple random sampling method. In each of these household, women aged 18 years and above were interviewed. Informed consent was obtained after explaining the purpose of the study. Those women who were not willing to participate in the study were excluded. Personalized interviews were conducted at their houses using a structured questionnaire.

Data obtained was analyzed using SPSS version 21. Descriptive statistics were calculated. Results were expressed in the form of simple proportions, mean and standard deviation.

RESULTS

The study was conducted among women from 150 households in Kuthambakkam village. The mean age of the study participants was 38.5±12.1 years (min:18 years & max:73 years). Their age distribution is depicted in Table 1.

Majority of the women were married or widowed (90.7% & 2.6% respectively) while the rest were unmarried. Only 13.3% were illiterates (Table 1).

Majority 70.7% women were residing in nuclear families. The total family income per month of these households ranged from Rs 500 – 80,000 (mean: Rs 8910 ± 7902). Under-five children were present in 64 families

(42.6%) and geriatric people in 33 families (22%).

It was found that more than half (58.6%) of the houses were semipucca followed by pucca houses (28.7%) and only 12.7% of houses were kutcha. Majority houses had cemented floor (63.3%), 14.7% had mud floor and rest were either tiled/ marble. Majority (55%) of the houses had only 2 rooms and 10% had only single room. Overcrowding was assessed using person per room criteria and was found to be present in 46% households.

Kitchen was not separate in 42.7% houses. Majority households used LPG (70%) as source of cooking fuel followed by wood (18%), kerosene (11.3%) and cow dung (0.7%). It was found that 4% of the houses did not have even windows in the kitchen while in remaining houses windows (64.7%) were the common mode of exhaust for smoke followed by exhaust fan (29.3%) and chimney (2%). When questioned if they keep the windows and doors open at the time of cooking, only 68% replied in affirmative. (Table 2)

The practice of burning mosquito coils and incense sticks was seen in 37.3% and 46% households respectively. The study found that men in the family smoked in 42 (28%) of households, of which 16 (38%) smoked inside their houses (Table 3). 13 (31%) were regular smokers, 19 (45.2%) smoked occasionally and 10 (23.8%) smoked rarely.

45% women were aware of potential sources of indoor air pollution. 43% women were aware that indoor air pollution is hazardous to their health and well being. 9% women reported respiratory illness in their family members.

Table 1: Distribution of women according to their age, marital status and education status (N= 150)

Age group 18-30	**Frequency** 44	**Percentage%** 29.3
31-40	52	34.7
41-50	28	18.7
51-60	18	12.0
61-70	8	5.3
Marital Status		
Unmarried	10	6.7
Married	136	90.6
Widowed	4	2.7
Education Status		
Illiterate	20	13.3
Literate	130	86.7

Table 2: Distribution of houses according to physical environmental characteristics (N=150)

Type of house	**Frequency**	**Percentage**
Kucha	19	12.7
Pucca	43	28.7
Semi pucca	88	58.6
Type of floor		
Mud	22	14.7
Cement	95	63.3
Tile	29	19.3
Marble	4	2.7
Number of rooms		
1	15	10.0
2	83	55.3
3	27	18.0
4	14	9.3
5	9	6.0
6	1	0.7
7	1	0.7
Ventilation		
Adequate	93	62.0
Not adequate	57	38.0
Type of cooking fuel		
LPG	105	70.0
Kerosene	17	11.3
Wood	27	18.0
Cowdung	1	0.7
Smoke outlet		
No windows present	6	4.0
Windows	97	64.7
Exhaust fan	44	29.3
Chimney	3	2.0
Kitchen		
Separate	86	57.3
Not separate	64	42.7
Windows and doors kept open during cooking		
Yes	102	68.0
No	48	32.0

Table 3: Distribution of Houses according to personal habits leading to Indoor air pollution

	Frequency	Percentage
Burning coils (N=150)		
Yes	56	37.3
No	94	62.7
Burning incense inside the house (N= 150)		
Yes	69	46.0
No	81	54.0
Smoking inside the house (N=42)		
Yes	16	38.0
No	26	62.0

DISCUSSION

In the present study almost one third of the houses did not use clean fuel for cooking (18% wood, 11.3% kerosene and 0.7% cow dung). According to National Sample Survey (NSS) 2010, carried out by Government of India, biomass fuel remains a widely used energy source in rural India where nearly 80% of households use them as the primary cooking fuel. In contrast, the majority of urban households use liquefied petroleum gas (LPG) as the primary cooking fuel; however, about 19% of urban households also use biomass fuel for cooking purposes.[9] The use of LPG, which is known to result in the lowest pollution levels within households, remains a nonfeasible proposition for bulk of India's population as a result of prices, limited supply, and access.[3]

Poverty, inaccessibility to improved cooking fuel, and lack of awareness about harms of biomass emissions are among the major factors that drive their widespread use. [9,10] The knowledge regarding association of indoor air pollution with health and disease was very poor in the present study as only 45% women had knowledge that indoor air pollution is a potential health hazard. Burning biomass fuels can have adverse effects on health because of its incomplete products of combustion which includes suspended particulate matter, carbon monoxide, poly aromatic hydrocarbons, poly organic matter, formaldehyde, etc.. The combustion of coal in particular results in production of oxides of sulfur, arsenic, and fluorine which can have deleterious effect on ones' health when inhaled for a prolonged duration of time.[11]

In India, an estimated 400,000 deaths from acute lower respiratory infection (ALRI) in children younger than five and 34,000 deaths from chronic obstructive pulmonary disease (COPD) in women are attributed annually to household solid fuel use, making this the third leading risk factor amongst all risk factors contributing to the national burden of disease and exceeding the burden attributable to outdoor air pollution[12,13]. Some of the earliest human evidence linking indoor air pollution from biomass combustion with respiratory health came from studies carried out in Nepal and India in the mid-1980s.[14 , 15]

Health hazards due to biomass fuels could be reduced to even more than 50% by using smokeless chulas (improved cooking stoves) with proper exhaust chimneys.[16] Studies have demonstrated that improved cook stoves reduce considerably the smoke, either by having a far better combustion or by having an excess of air or with a combination of both, the health impacts of smoke from open fires inside dwellings can be reduced using such improved cook stoves, changes to the environment (e.g. use of a chimney), and changes to user behavior (e.g. drying fuel wood before use, using a lid during cooking).[17] In the present study, windows (64.7%) were the common mode of exhaust for smoke followed by exhaust fan (29.3%) and chimney (2%). 4% of the households didn't even have proper windows for the escape of smoke.

Apart from using biomass fuel, other habits like burning of incense sticks and mosquito coils in the household also leads to indoor air pollution.[18,19] In the present study more than one third of the houses had a practice of burning mosquito coils inside the house and almost half of the women burnt incense sticks in the house.

According to WHO passive smoking or the second hand smoke is a serious form of Indoor air pollution.[20] In the present study 38% of the men who were smokers were smoking inside the house adding up to the risk of diseases to the inmates of the house.

CONCLUSION

Choice of cooking fuel depends on the socio-economic status of the people however; the choice of inhaling indoor air pollutants is not dependent on the socio-economic status alone. Indoor air pollution is a looming threat to the health of people and is an often ignored public health issue. Hence, it becomes

imperative that people should be made aware of possible indoor air pollutants like bio mass fuel, passive smoking, incense sticks, mosquito coils etc and its deleterious effect on ones' health by conducting regular Information Education & Counseling (IEC) activities among the people. Improved cooking stoves or subsidized LPG should be made accessible to all the people irrespective of their socioeconomic status.

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Conflicts of Interests: Nil

REFERENCES

1. Kumar R, Nagar JK, Goel N, Kumar P, Kushwah AS, Gaur SN. Indoor air pollution and asthma in children at Delhi, India. Pneumonol Alergol Pol. 2015;83(4):275-82.
2. Indoor Air Thematic Briefing 2: Indoor Air Pollution, Health and Burden of disease. Geneva: WHO. [Internet] [cited on 31/1/2018] Available from: http://www.who.int/indoorair/info/briefing2.pdf
3. Balakrishnan K, Ramaswamy P, Sambandam S et al. Air pollution from household solid fuel combustion in India: an overview of exposure and health related information to inform health research priorities. Glob Health Action. 2011;4:5638.
4. Sukhsohale ND, Narlawar UW, Phatak MS. Indoor Air Pollution from Biomass Combustion and its Adverse Health Effects in Central India: An Exposure-Response Study. Indian J Community Med. 2013;38(3):162-167.
5. Mahesh PA, Jayaraj BS, Prabhakar AK, Chaya SK, Vijaysimha R. Identification of a threshold for biomass exposure index for chronic bronchitis in rural women of Mysore district, Karnataka, India. Indian J Med Res. 2013 Jan;137(1):87-94.
6. Census of India, Ministry of Home Affairs, Government of India, New Delhi, 2011.
7. Sehgal M, Rizwan SA, Krishnan A. Disease burden due to biomass cooking-fuel-related household air pollution among women in India. Glob Health Action. 2014;7:25326.
8. Kankaria A, Nongkynrih B, Gupta SK. Indoor Air Pollution in India: Implications on Health and its Control. Indian J Community Med. 2014;39(4):203-207.
9. Ministry of Statistics and Programme Implementation, Government of India (2012). Energy sources of Indian households for cooking and lighting, NSS 66th round, July 2009 _ June 2010. New Delhi: National Sample Survey Office; 2012. Report No.: 542. Available from:http://www.indiaenvironmentportal.org.in/files/file/Energy%20Sources%20of%20Indian%20Households.pdf
10. Houselisting and Housing Census Data Highlights. [Internet] 2011 [cited on 31/1/2018] Available from: http://censusindia.gov.in/2011census/hlo/hlo_highlights.html
11. Zhang J, Smith KR. Indoor air pollution: A global health concern. Br Med Bull 2003;68:209-25.
12. Smith KR. The national burden of disease in India from indoor air pollution. Proc Natl Acad Sci USA 2000;97:13286-93.
13. Smith KR, Samet JM, Romieu I, Bruce N. Indoor air pollution in developing countries and acute lower respiratory infections in children. Thorax 2000;55:518-32.
14. Smith KR, Aggarwal AL, Dave RM. Air pollution and rural biomass fuels in developing countries: a pilot village study in India and implications for research and policy. Atmos Environ 1983;17:2343-62.
15. Pandey MR. Prevalence of chronic bronchitis in a rural community of the hill region of Nepal. Thorax.1984;39:331-6.
16. Adler T. Better burning, better breathing: improving health with cleaner cook stoves. Environ Health Perspect. 2010; 118(3): A124–A129.
17. Chengappa C, Edwards R, Bajpai R, Naumoff Shields K, Smith KR. Impact of improved cookstoves on indoor air quality in the Bundelkhand region in India. Energy for Sustainable Development 2007; 11: 33_44.
18. Kumar R, Gupta N, Kumar D, Mavi AK, Singh K, Kumar M. Monitoring of indoor particulate matter during burning of mosquito coil, incense sticks and dhoop. Indian J Allergy Asthma Immunol. 2014;28:68-73.
19. Liu W, Zhang J, Hashim JH, Jalaludin J, Hashim Z, Goldstein BD. Mosquito coil emissions and health implications. Environ Health Perspect. 2003 Sep;111(12):1454–1460.
20. About second hand smoke. Tobacco Free Initiative (TFI); Geneva: WHO. [Internet] [cited on 31/1/2018] Available from: http://www.who.int/tobacco/research/secondhand_smoke/about/en/

Factors Influencing Semen Analysis in Case of Infertility

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ABSRACT

Background / Objectives: In recent years, infertility in men has increased, which may be associated with their advancing age, habits like tobacco use, alcoholism and occupation. Semen parameters might be sensitive markers for these influencing factors.

Materials and Method: This study was conducted in all patients referred to Pathology department for semen analysis from Obstetrics and Gynaecology department in KVG Medical College and Hospital, Sullia from July 2011 to August 2013. 50 cases were included in this study. Information was collected as per the proforma by questionnaire from the patients about their occupation, smoking habits, tobacco chewing and alcohol intake. Semen examination was done as per WHO standard protocol procedures. Patients were classified into tobacco consumers, alcoholics and combined smokers & alcoholics. All these cases were again grouped according to age and occupation .

Results: Semen parameters like volume, motility, count, density and morphologically normal spermatozoa were comparatively reduced in tobacco users & combined alcoholics & tobacco users. Variation of semen quality with respect to age was not significant.

Conclusion: The influence of advancing age and occupation like drivers (radiant heat), and agriculture (gonadotoxic pesticides and fertilizers) could probably be considered as additive factors for oligozoospermia.

Keywords: *age, alcohol, occupation, semen parameters, tobacco use*

INTRODUCTION

Parenthood is considered one of the most important life achievements in the Indian society. The importance of surgery to the psychological wellbeing of the couple can also be gauged from the fact that the overwhelming majority of patients seeking vasectomy reversal in India do so not because they have remarried or want additional children but because they have lost an only child. This compares with 2.6% patients in U.S. who seek a vasectomy reversal for this reason.[1]

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Infertility is defined as the failure to achieve a pregnancy within one year of regular (atleast 3 times per month) unprotected intercourse. It effects approximately 15% of sexually active couples ; a causative male factor is present in approximately 40% of cases. Oxidative stress also contributes to defective spermatogenesis and poor quality of sperm associated with idiopathic male factor infertility.Infertility is regarded as male factor when an alteration in sperm concentration or motility or morphology is present in atleast one sample of two sperm analysis, which comply with WHO 1999 guidelines, collected between one to four weeks apart.[2]

The causes of male infertility fall into one of three categories : pretesticular, testicular and post-testicular .[3]

Detection of male fertility problems relies heavily on the assessment of conventional parameters, namely sperm concentration, motility, morphology, viability,

volume and Ph.[4]

Rapid developments have occurred in the management of couple infertility due to a male factor. These have stimulated renewed interest in semen analysis, which has become more correct, more reliable and more informative.[5]

Semen analysis is the initial and most essential step of the infertility evaluation, which also includes a physical exam, hormonal evaluation, sperm function testing, and genetic analysis. [6] In practice, however, because of a lack of standardization, a wide variation in results among laboratories, and an apparent need for increased quality control.[7]

Previous estimates of infertility help-seeking were based on data from women. Men report a percentage seeking help that appears to be somewhat lower than reported by women. About 1 in 5 of those seeking help reported male-related infertility conditions.[8]

Basic semen analysis is used to evaluate the male partners of couples with infertility . Conventional techniques for the evaluation of semen have been standardized by the World Health Organization (WHO) [9].

MATERIALS AND METHOD

Detailed history of age, occupation, tobacco use, smoking and alcohol intake was taken as per the proforma by questionnaire and detailed physical examination including genital examination was done. Semen samples were collected from all patients by masturbation after 2-5 days of sexual abstinence in wide mouthed polypropylene bottle and these semen samples were processed and analyzed by single qualified person.

I. MACROSCOPIC EXAMINATION

1). Liquefaction : Normal semen sample liquefies within 30 minutes at room temperature. Occasionally, samples may not liquefy, in which case additional treatment like, mechanical mixing or enzyme digestion may be necessary.

2). Color : Semen sample is examined immediately after liquefaction or within 1hour of ejaculation. Normally, semen is homogenous grey opalescent and may appear less opaque if sperm concentration is low. Red brown when mixed with blood or yellow in patients with jaundice or taking vitamins.

3). Volume : of ejaculate is measured using graduated cylinder.

4). Viscosity : is measured by gentle aspiration into wide bore 5ml pipette and then allowing the semen to drop by gravity and observing the length of the thread. A normal sample leaves the pipette as small drops. In cases of abnormal viscosity, the drop will form thread more than 2cm long. Alternatively, the viscosity may be evaluated by introducing a glass rod into sample and observing the length of the thread that forms on withdrawal of the rod.

5).pH : is measured by using pH paper by evenly spreading one drop of semen onto the pH paper and after 30 seconds, the color change is compared with the callibration strip.

II. MICROSCOPIC EXAMINATION

A) Fixed volume 10µl semen is taken on to a clean glass slide with micropipette and covered with a 22mm×22mm coverslip. After stabilizing for 1minute, wet preparation is examined under light microscopy to note :

i) Motility : Select the fields atleast 5mm from the edge of the coverslip.

- Atleast 5 microscopic fields are assessed to classify 200 spermatozoa.
- Motility is graded as-:

  a) Rapid progressive motility

  b) Slow progressive motility

  c) Non motile forms

  d) Dead forms

ii) Preliminary estimation of sperm concentration : Scanning the wet mount and estimating the number of spermatozoa per high power field will help to estimate sperm count roughly, which is used to decide the dilution factor for determining sperm concentration by hemocytometry.

B) Assessment of sperm concentration :- The concentration of spermatozoa should be determined using hemocytometer method on two seperate preparations of

semen sample, one on each side of counting chamber. The dilution is determined from preliminary estimation of sperm concentration.

Constituents of semen diluting fluid:

Sodium bicarbonate 5gm

Formalin (neutral) 1ml

Distilled water 99ml

Procedure

- Automatic pipettes or WBC pipettes are used for making dilutions.
- Charge the improved Neubauer hemocytometer with 10µl of thoroughly mixed diluted sample. Later, allow to stabilize for about 5 minutes in a humid chamber to prevent drying.
- Spermatozoa in the RBC chamber are counted.
- Sperm count per ml = N/conversion factor x10x6 N= number of sperms in RBC chamber.

C). Assessment of sperm morphology:

- Preparation of smears by feathering technique as peripheral blood smear preparation.
- Air dry the smear. Later fix in equal parts of 95% ethanol & ether for 5-15minutes.
- Stain with Leishman stain or stain in aqueous basic fuchsin for 5 minutes.

* Examine the slide under oil immersion, all normal &abnormal spermatozoa are assessed and scored. Atleast 200 spermatozoa are counted and scored.

D). Calculation of Leukocytes : Leukocytes in millions per ml= w×c/100 W- no.of leukocytes per 100 sperms counted

C- sperm count

E). Calculation of immature germ cell: Immature germ cell in millions per ml = N×C/100

N-number of immature germ cells per 100 sperms counted. C- Sperm Count.

RESULTS

AGE:

The mean age of the patients was 25.54. The distribution of semen quality among age groups is shown in Table 1 .

TABLE-1: Distribution of semen quality among age groups:-

Semen		Age Groups (in years)			
Quality	21-25	26-30	31-35	36-40	41-45
nz	2	6	4	-	1
atz	7	3	3	-	2
oz	14	10	8	3	1
atz	6	3	2	-	1
tz	-	-	-	-	-
otz	-	-	-	-	-
oz					

nz- Normozoospermia, oz- Oligozoospermia, atz- Asthenoteratozoospermia, tz- Teratozoospermia

13/50 cases were normozoospermic. The remaining 37 cases were classified into oligozoospermic and asthenozoospermic. All these cases were again stratified according to age (21-25, 26-30, 31-35, 36-40, 41-45) and occupation (sedentary, business, drivers & agriculture) for statistical analysis.

Control Group :

These cases constituted 26% of 50 cases (13/50).

The mean values of controls are shown in table 2. Mean age was 31.3yrs

TABLE-2

Parameters	Values
n	13
Age in years	31.3
Volume (ml)	2.57
Liquefication Time (min)	28.84
Sperm Count	69.24
Total Motility	58.07
a%	36.53
Morphologically normal sperms (%)	78.84
Morphologically abnormal sperms (%)	21.15
WBC (10^6/ml)	5.76

Normal controls are stratified according to age group

Table No. 3 :

Parameters	21-25	26-30	31-35	36-40		41-45
n	2	5	4	-		2
Volume	2.25	2.4	1.25	-		3.5
Liquefaction time	37.5	24	30	-		30
Sperm count	81.4	69.34	62.12	-		71.1
Total motility	60	58	61.2	-		50
a%	45	37	40	-		20
Morphologically normal	82.5	83	70	-		82.5
sperms						
Morphologically abnormal	17.5	17	30	-		17.5
sperms						
WBC Cells	3	7.2	5.2	-		8

Stratification of normal control according to age group

Maximum no. of cases belong to age group 26-30 (n=5). Semen volume was Highest in age group 41-45 years. Liquefaction time was highest in age group 21-25 years. The sperm count was highest in the youngest age group (21-25 years). But not much difference was there in between other age groups. The progressive motility was least in the oldest age group (41-45 years) and not much difference in other age groups. Rapid progressive motility was least in 41-45 years. The percentage of normal sperms was least in age group 31-35 years (70%) whereas other age groups did not show much variation . Abnormal sperms was highest in age group 31 – 35 years . WBC cells were highest in age group 26 – 30 years. No significant change in pH was observed between age groups.

Table No. 4 : Distribution of control groups according to their occupation

Parameters	Agriculture	Sedentary	Business	Drivers
n	2	5	4	2
Volume	2	2.7	1.25	3.5
Liquefaction Time	35	33	23.75	22.5
Sperm Count	61	74.68	68.7	65
Total Motility	72.5	54	57.5	55
a%	50	31	37.5	35
Normal sperms	70	83	77.5	80
Abnormal sperms	30	17	22.5	20
WBC	3.5	6	8	3

The maximum were sedentary workers. The drivers had the maximum semen volume.

The liquefaction time was highest among agriculturalists and least in drivers. Sperm

Count was maximum in sedentary group and least in agriculture.

The motility was least in drivers and maximum in agriculture. The rapid progressive motility was least in sedentary.

The percentage of normal sperms was highest in sedentary groups and least in agriculture. The percentage of WBC cells was highest in business group and least in drivers.

DISCUSSION

In this study 50 cases were studied excluding the patients with history of genitourinary tract infection, systemic illness, tuberculosis, cryptorchidism, mumps, testicular injury, obstructive azoospermia and diabetes mellitus.

EFFECT OF AGE ON SEMEN QUALITY

In this study, 13 cases belonged to the control group. The mean age in this group was 31.3 years. The semen quality was satisfactory. The mean sperm count was 69.24 million/ml. The total motility was 58.07% whereas rapid progressive motility was 36.53%. The morphologically normal sperm percentage was 78.84%.

Also, in this study, out of 50 cases, the sperm count was highest in the youngest age group but not much significant difference in other age groups. The rapid progressive motility was least in 41-45 years age group. The percentage of normal sperms was least in age group 31-35 years(70%).

In a study conducted by Kidd SA, Eskenazi B, Wyrobek AJ,it was found that increase in male age is associated with a decline in semen volume, sperm motility, and sperm morphology.[10]

The findings of this present study was also supported by another study done by Liliane FS, Joao BA, Claudia GP, Ana LM, Fabiana CM et al which demonstrated a morphological evaluation by MSOME with increased age.[11]

Table No. 5

STUDY	YEAR	SPERM COUNT	TOTAL MOTILITY	RAPID PROGRESSIVE MOTILITY	ABNORMAL FORMS
Kidd SA et al[10]	2002	Decreased	Decreased	Decreased	Increased
Liliane FS et al[11]	2006	Decreased	Decreased	Decreased	Increased
Present Study	2013	Decreased	Decreased	Decreased	Increased

Comparision of effect of age on quality by various workers

EFFECT OF OCCUPATION ON SEMEN QUALITY:

The patients were divided into agriculture, drivers, sedentary and business group.In the control group, the maximum were sedentary workers. The liquefaction time was highest among agriculturalists. The sperm count was maximum in sedentary group and least in agriculture.

The percentage of normal sperms was highest in sedentary group and least in agriculture.

Outside the control group, the maximum number of oligozoospermic cases belonged to agriculture followed by drivers and least in sedentary.

Asthenozoospermic cases also were maximum in agriculture category followed by drivers.

Mukhopadhyay D et al in 2006 concluded that occupational stress can have deleterious effect on semen parameters. He noticed a decline in sperm count, total motility and increase in abnormal forms.[12]

Johrami R et al also found similar findings in 2013 and concluded that radiant heat and exposure to pesticides leads to adverse affect on semen quality.[13]

OCCUPATION

Table No. 6

STUDY	YEAR	SPERM COUNT	TOTAL MOTILITY	RAPID PROGRESSIVE MOTILITY	ABNORMAL FORMS
Johrami R et al[13]	2013	Decreased	Decreased	Decreased	Increased
Mukhopadhyay D et al[12]	2006	Decreased	Decreased	Decreased	Increased
Present study	2013	Decreased	Decreased	Decreased	Increased

Comparision of effect of occupation on semen quality by various workers

In control group the mean sperm count, total motility,rapidprogressive motility and morphologically normal spermatozoa were 69.24 million/ml, 58.07%, 36.53% and 78.84% respectively.Among the control group, maximum were sedentary workers. The drivers had the maximum semen volume.The motility was least in drivers. The percentage of normal sperms was highest in sedentary groups and least in agriculture. It is evident from the results of the present study that- Semen quality is declining in the past few decades.

Age alone did not alter the semen quality significantly but act as a minor risk factor.

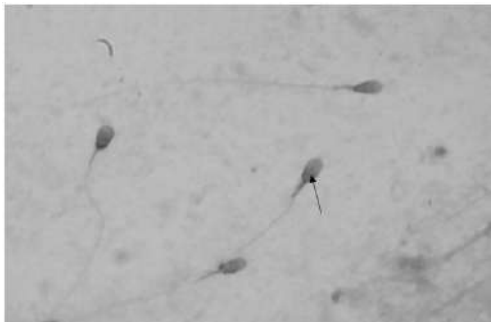

Fig. 1: Photomicrograph of Normal Spermatozoa

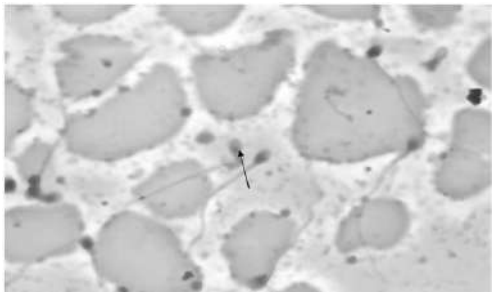

Fig. 2: Photomicrograph of spermatozoa with bent midpiece

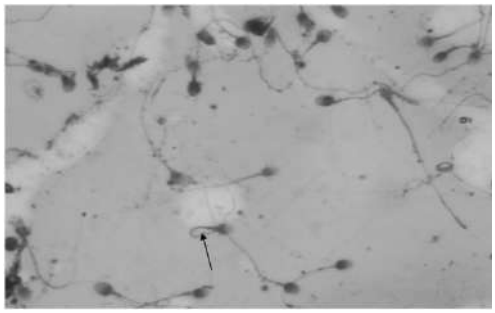

Fig. 3: Photomicrograph of spermatozoa with bent tail

The influence of advancing age and occupations like Agriculture (specially use of gonadotoxic pesticides and fertilizers) and Drivers(radiant heat) can be considered as hazards and additive factors for reduced semen quality.

Therefore, it can be concluded that in concordance with other researches that semen quality is declining and there is a role of multi factorial etiology in male infertility.

Conflict of Interest- None

Source of Funding - Self

Ethical Clearance- Prior Approval Taken

REFERENCES

1). Kumar R. Surgery for azoospermia in the Indian patient : Why is it different ? Indian J Urol 2011; 27: 98-101.

2). Agarwal A,Sekhon LH. Oxidative stress and antioxidants for idiopathic oligoasthenoteratospermia: Is it justified?. Indian J Urol 2011;27:74-84.

3). Rosai J.Male Reproductive System-Testis.Chapter 18 in Rosai and Ackerman's Surgical Pathology.10th Edition, Mosby 2011:1334-6.

4). Kordum-Skelin I, Turek PJ. Testis and Scrotum: Cytology of testicular and scotal masses and male infertility. Chapter 20 in Diagnostic Cytopathology by Winifred Gray. 3rd edition. Churchill Livingstone 2010; 537-55.

5). Comhaire F , Vermeulen. Human semen analysis. Hum. Reprod. Update , 1 , 4 ; 343-362.

6). Nallela KP, Sharma RK, Aziz N, Agarwal A.Significance of sperm characteristics in the evaluation of male infertility. Fertil Steril 2006;85:629-34.

7). Keel BA. Within and between – subject variation semen parameters in infertile men and normal semen donors.Fertil Steril 2006:85:128-34.

8). Anderson JE, Farr SL, Jamieson DJ, Warner L, Macaluso M.Infertility services reported by men in the United States:national survey data.Fertil Steril 2009;91:2466-70.

9). Pasqualotto FF, Sobreiro BP, Hallak J, Athayde KS, Pasqualotto EB, Lucon AM.High percentage of abnormal semen parameters in a prevasectomy population. Fertil Steril 2006;85:954-60.

10). Kidd SA, Eskenazi B, Wyrobek AJ. Effects of male age on semen quality and fertility : a review of the literature. Hum Reprod . (2003) 18 (2): 447-454.

11). Liliane FS, Joao BA, Claudia GP, Ana LM, Fabiana CM et al. The effects ao male age on sperm analysis by motile sperm organelle morphology examination (MSOME). Reproductive Biology and Endrocrinology 2012 , 10 :19 ; 10-19.

12). Mukhopadhyay D, Varghese AC, Pal M, Banerjee SK, Bhattacharyya AK, Sharma RK et al. Semen quality and age-specific changes: a study between two decades on 3,729 male partners of couples with normal sperm count and attending an andrology laboratory for infertility-related problems in an Indian city. Fertil Steril 2010;93:2247–54.

13). Johrami R, Davari S, Mehrabipoor F. How can you appraisal the effect of occupational factors on male reproductive function? Scientific Information Database;2013.

Awareness of Undergraduate Students Regarding Blood Donation among Non-Medical Colleges in Selected Setting

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ABSTRACT

Background: Blood is life sustaining fluid and is valuable and donating blood can save the life of individuals. The South East Asia's estimated blood requirement is about 16 million units per year, but it collects just about 9.4 million units annually, leaving a gap of 6 million units. (World health organization[1]**. Objective:** of the study to determine the awareness level of non- medical undergraduate students regarding blood donation using questionnaire on awareness regarding blood donation **Method:** A descriptive survey was conducted among 104 non-medical undergraduate students who were studying at selected setting. Random sampling technique was adopted for se lection of the colleges and Multi stage (Proportionate and random) sampling technique for selection of the sample and Tools used were demographic proforma and tool for assessment of level of awareness regarding blood donation, data was obtained by self-administered questionnaire. **Results:** Majority 79(75.9%) of the sample had moderate level of awareness regarding blood donation and around 24 (23.7%) of the sample had high level awareness regarding blood donation. **Conclusion:** With help of organizing various awareness progarmmes we can improve the awareness which will make the students to participate actively in voluntarily donating the blood.

Keywords: *Awareness, blood donation, non-medical undergraduate students.*

BACKGROUND

Blood can save millions of life, and young people are the hope and future of a safe blood supply in the world. The South East Asia's estimated blood requirement is about 16 million units per year, but it collects just about 9.4 million units annually, leaving a gap of 6 million units [1]. India with its huge population of over 1 billion is lagging behind in blood collection. India has 2760 blood banks that can collect 9 million units of blood annually, but collects only 7 million. Human blood is an essential element of human life with no substitute. The theme of World Health Day in 2000 was "Blood saves Life [2]. Safe blood starts with me." Nowadays, blood transfusion is still one of the main components of care and treatment to patients with serious conditions such as trauma, major surgeries, chemotherapy, and patients in need of long-term therapies.

However, problems regarding a permanent shortage of blood are observed in blood services all over the world. The only source of blood is blood donation recruitment of voluntary, non-remunerated blood donors poses major challenges to transfusion services throughout the world. Increase in the level of awareness and development of a positive attitude towards blood donation is the top most priority of all national blood transfusion centers. The first step for attaining this goal is to perform comprehensive studies about awareness and attitude of the population towards blood donation to gauge the present situation, beliefs and both positive and negative attitudes of the population towards blood donation.

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OBJECTIVE

To determine the awareness level of non- medical undergraduate students regarding blood donation using

questionnaire on awareness regarding blood donation.

METHOD

A descriptive survey was conducted among 104 non-medical undergraduate students who were studying at selected colleges like College of Journalism and Mass Communication, College of Agriculture Sciences, College of Architecture and College of Law & Legal Studies under Teerthanker Mahaveer University. Random sampling technique was adopted for se lection of the colleges and Multi stage (Proportionate and random) sampling technique for selection of the sample and The following criteria were set for the sample selection - of both male and female who enrolled and studying in selected setting, who are willing to participate in the study and who are studying in non-medical colleges of selected setting

Tools used were demographic proforma and tool for assessment of level of awareness regarding blood donation, data was obtained by self-administered questionnaire.

RESULTS

Obtained data was analyzed based on objectives of the study by using SPSS 16.0 version. Out of 104 sample majority (43.5%) of them were in the age majority (60.5%) of the sample were above 20 year age and remaining (39.4%) are below 20 year of age. Most of sample belonged to male gender (56.6%) and majority of the sample were belongs to Hindu religion (73%). most (33.65%) of the sample fathers were graduates and even most (33.6%) of the sample mothers were also graduates, majority of the sample (85.5%) were didn't donate blood ever before, around 34.6% sample and their families underwent for blood transfusion.

Table-1 Frequency and percentage sample on the basis of level of awareness (n = 104)

S.No	Level of awareness regarding blood donation	f	%
1	Low level of awareness	1	0.9
2	Moderate level of awareness	79	75.9
3	High level of awareness	24	23.07

The data presented in table 1 revealed that majority (75.9%) of the sample were at moderate level of awareness regarding blood donation, only 0.9% of them at low level of awareness regarding blood donation.

DISCUSSION

Most 63(60.5%) of the sample were in the age of 20 years and above 20, majority 60 (56.6%) of them were male, most 76 (73%) of the sample belong to the Hindu Religion. Majority of the subjects fathers 33(31.7%) were with post graduate and above educational qualification and majority of subjects mothers 35 (33.6%) were graduated, around 89 (85.5%) of the sample were never donated blood before.

Around 59 (56.7%) had never received donated blood for themselves or for their family member and about 68 (65.3%) sample had never underwent for blood transfusion. Majority 79(75.9%) of the sample had moderate level of awareness regarding blood donation and around 24 (23.7%) of the sample had high level awareness regarding blood donation.

The presented study was supported by a study conducted among 288 (Male- 162, Female-126) subjects of age group 18- 60 at rural Puducherry The results shows that majority (79.5%) subjects were aware blood can be donated. Around 17.5% of subjects had past history of blood donation. Most 55% of the subjects donated blood to their relatives.[3]

The present study supported by a study conducted among health science students at South India.The result found that the majority (60%) of subjects have high level of awareness and only (20.7%)subjects have low level of awareness.[4]

CONCLUSION

The present study concluded that non-medical undergraduate students were have the some awareness regarding blood donation and. Some of the subjects didn't donate the blood. With help of organizing various awareness progarmmes we can improve the awareness which will make the students to participate actively in voluntarily donating the blood.

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REFERENCES

1. World Health Organization. (2014)
2. Canadian Medical Protective Association, News and Analysis, APR, 4, 2000, 162(7).
3. Shidam UG, Lakshminarayanan S, Roy G. Knowledge and attitude regarding blood donation in rural puducherry, india National Journal of Community Medicine.2015. 1(6), 64-68.
4. Sabu KM, Remya A, Binu VS, Vivek R.Knowledge, attitude and practice on donation among health science students in a University campus, South India, Online J Health Allied Scs.2011, 10(2).
5. Asif N, Hassan K. A study on voluntary blood donation in Islamabad Journal of Islamabad Medical & Dental College (JIMDC), 2015,5(1),1-2.
6. Singh N, Singh S, Chauhan R. A Study on Awareness about Blood Donation and Blood Transfusion Among Junior Doctors in Teaching Hospitals of Meerut, International Journal of contemporary medical research, 2016,6(3).
7. Kowsalya V, Vijayakumar R. A study on knowledge, attitude and practice regarding voluntary blood donation among medical students in Puducherry India, Pak.J.Biol.Sci, 2013, 16(9).439-442.

Surveillance Hypertension Patients in Eastern India: Our Experience

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ABSTRACT

Background: It is unknown to what extent General Practitioners (GPs) manage hypertension (HT) differently in older patients, as compared to younger age groups. The purpose of our study was to know the incidence of hypertension in older patients as compare to younger age groups.

Method: It this retrospective observational study the data of hypertension patients attending at MKCG medical college and IMS and SUM Hospital were documented and analyzed. The study population consisted of all patients aged 60 years or older with at least one blood pressure (BP) measurement during the inclusion period, without pre-existent HT, diabetes mellitus (DM) or atherosclerotic cardiovascular disease at time of study start.

Results: We included 19,500 patients from 159 GP's practices of whom 1,181 (6.1 %) were newly diagnosed with HT. Corrected for age-adjusted SBP, older patients were less likely to be diagnosed with HT (odds ratio per year age increase 0.98, $p < 0.001$). Corrected for age-adjusted SBP, no significant effect of age on the probability of treatment in newly diagnosed HT patients was observed ($p = 0.82$).

Conclusions: This study showed that GPs are less inclined to diagnose HT with increasing patient age, but do not withhold treatment when they diagnose HT in older patients.

***Keywords**: Hypertension, Aged 80 and over, Age factors, Electronic health records, General practice*

INTRODUCTION

Evidence on the effectiveness of treatment of hypertension (HT) in patients of 80 years and older is conflicting [1–4]. Traditionally older patients were ignored in Dutch guidelines as patients up to 65 years old were treated ac-cording to their risk estimate of atherosclerotic cardio-vascular disease, for which blood pressure (BP) was one of the criteria [5]. For older patients however, the gen-eral practitioner (GP) had to rely on his/her clinical judgment, which varied widely as to when it was appropriate to start treat ment [6]. In 2008 the Hypertension in the Very Elderly Trial (HYVET) [1] indicated that treatment of HT in patients of 80 years and older was beneficial on mortality from stroke and overall mortality. There is evidence that high BP is not associated with a higher risk of death in the frail [3], but further analysis of the HYVET study showed that both frail and fitter patients appeared to gain from antihypertensive treatment [5]. In 2012 the Dutch cardiovascular risk management guidelines [7] set systolic blood pressure (SBP) target values below 150–160 mmHg in older patients. Similarly, guidelines of the British National Institute for Health and Care Excellence (NICE), the European Society of Hypertension (ESH) and the European Society of Cardiology (ESC) recommended SBP target values below 150 mmHg in patients over 80 years old

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[8, 9]. However, there is evidence that compliance to these revised guidelines is incomplete [10], particularly in older patients [11, 12] and a recent review suggested that indeed, each patient's individual clinical condition may need to be taken into account for optimal HT treatment [13]. In practice, other than patient-related barriers, e.g. doctor or system related barriers, whether they are appropriate or inappropriate, may play a role in incomplete guideline compliance. In light of the conflicting evidence and lack of information whether GPs manage HT differently in older patients, we wanted to investigate how HT is diagnosed and treated in this age group, as compared to younger patients.

METHOD

It this retrospective observational study the data of hypertension patients attending at MKCG medical college and IMS and SUM Hospital were documented and analyzed. The study population consisted of all patients aged 60 years or older with at least one blood pressure (BP) measurement during the inclusion period, without pre-existent HT, diabetes mellitus (DM) or atherosclerotic cardiovascular disease at time of study start. All the data were analyzed by SPSS 20 software and documented.

RESULTS

Patient characteristics Our cohort consisted of 19,500 patients aged 60+ with at least one BP measurement and without a diagnosis of HT, DM or arterial cardiovascular disease or antihypertensive medication prior to the first BP measurement. The source population comprised of 131,545 patients aged 60 years or older. Sixty one percent were 60–69 years old, 28.2 % were 70–79 years old and 10.8 % were 80 years or older. The percentages of women in these age groups were 55.7, 57.9 and 64.0 % respectively. Table 1 shows SBP values, by age group and gender. Outcomes Percentages of patients with diagnosis of hypertension, by age and systolic blood pressure shows the percentages of patients with a new diagnosis of HT for each age- and SBP-group with 95 % confidence intervals. The corresponding numbers are reported in Table 2. Of those patients with a BP between 160 and 179 mmHg and aged 60–69 years, 18.2 % (16.5–20.0)

had a new diagnosis of HT within 1 month. For patients of 70–79 years and 80 years and older within the same BP group these percentages were 12.1 % (10.2–14.2) and 7.1 % (5.0–9.9) respectively. The p-value for trends between age groups was significant in all three BP groups between 140 and 200 mmHg, indicating that, within these SBP groups, older patients are less likely to be diagnosed as hypertensive than younger patients. Effect of systolic blood pressure Z-scores, age and gender on new diagnosis of hypertension The outcomes of the logistic regression analysis with newly diagnosed HT as outcome were as follows. The unadjusted odds ratio (OR) for the SBP Z-score was 4.30 (95 % CI 4.01 – 4.61; $p < 0.001$). Adjusted for age, the OR for the SBP Z-score was 4.35 (4.05–4.67; $p < 0.001$). This adjusted OR of 4.35 for SBP Z-score means that the odds of new diagnosis of HT is multiplied by 4.35 when the SBP increases by one standard deviation. Adjusted for SBP Z-score, age had a significant effect on the probability of diagnosis of HT (OR 0.98 per year age increase, 95 % CI 0.97–0.99, $p > 0.001$). We found no significant interaction between age and SBP Z-score in our model. Gender had no significant contribution to the model.

This model permits calculating the probability of a new diagnosis of HT on basis of a given SBP Z value and age. For example: a 60-year-old male patient with a SBP Z-score +1 (165 mmHg) has a predicted probability of a new diagnosis of 15.9 % (95 % CI: 14.5–17.3 %). The probability for an 80-year-old with the same SBP Z-score (170 mmHg), is only 11.2 % (95 % CI: 10.1–12.5 %). These findings are illustrated in which shows the predicted probabilities of a new HT diagnosis, in relation to SBP and age. Percentages of patients with treatment of hypertension, by age and systolic blood pressure We calculated the percentages of patients that received antihypertensive treatment within 4 months after being diagnosed as having HT. In the group with an SBP of 140–159 mmHg for instance, 45.3 % (37.2–53.6) of the 60–69 years old patients and 50.0 % (18.8–81.8) of the 80 years and older patients were treated; and in the group with an SBP of 160–179 mmHg, 69.9 % (64.7–74.6) of the 60–69 years old patients and 50.0 % (33.2–66.8) of the 80 years and older patients were treated. For details on all age groups please see Table 3. None of the p-values for age-related trends were significant. Effect of systolic blood pressure Z-scores, age and gender on treatment after diagnosis of hypertension For the outcome treatment, the OR for the SBP Z-score was 2.96 (95 % CI: 2.45–3.57). Age and gender had no significant contribution to the model. (OR for age 1.00, 95 % CI: 0.98–1.02, $p = 0.82$).

Table: 1 Systolic Bolld Pressure by gender and age mean SBP with standard deviation; percentages above 140 mmHg and 160 mmHg

Age	N	Gender	SBP (mmHg) Mean	SD	SEP>140 mmHg	SBP> 160 mmHg
60-69	5270	Male	142	199	55.8%	20.7%
	6619	Female	141	20.7	53.8%	20.8%
70-79	2316	Male	145	20.8	63.1%	26.4%
	3182	Female	146	21.2	65.1%	28.3%
80+	761	Male	146	21.6	64.5%	27.9%
	1352	Female	149	22.2	71.1%	32.0%

Table 2: New diagnosis of hypertension within one month after inclusion

SBP (mmHg)	Age (years)	N	New diagnosis (%)	P for trend
<=130	60-69	5385	0.5 (0.3-0.7)	0.61
	70-79	1965	0.6 (0.3-1.1)	
	80+	661	0.2 (0.0-0.9)	
140-159	60-69	4029	3.4 (2.9-4.0)	<0.001
	70-79	2019	2.5 (1.9-3.2)	
	80+	807	0.7 (0.3-1.6)	
160-179	60-69	1829	18.2 (16.5-20.0)	<0.001
	70-79	1028	12.1 (10.2-14.2)	
	80+	424	7.1 (5.0-9.9)	
180.199	60-69	504	34.9 (30.9-39.2)	0.002
	70-79	392	30.9 (26.5-35.6)	
	80+	156	21.2 (15.5-28.2)	
200+	60-69	142	48.6 (40.5 – 56.7)	
	70-79	94	39.4 (30.1-49.5)	
	80+	65	41.5 (30.4-53.7)	

Table: 3 Treatment within four months after inclusion in diagnosed hypertension patients

SBP (mmHg)	Age (years)	N	Anthypertensive treatment (%)	P for trend
<=130	60-69	26	30.8 (16.5-50.0)	0.70
	70-79	12	33.3 (13.8-60.9)	
	80+	1	0.0 (0.0-79.3)	
140-159	60-69	137	45.3 (37.2-53.6)	0.70
	70-79	50	48.0 (44.8-62.5)	
	80+	6	50.0 (18.8-81.8)	
160-179	60-69	332	69.9 (64.7-74.6)	0.15
	70-79	124	71.0 (62.4-78.2)	
	80+	30	50.0 (33.2-66.8)	
180.199	60-69	176	86.9 (81.2-91.1)	
	70-79	121	81.8 (74.0-87.7)	
	80+	33	81.8 (65.6-91.4)	
200+	60-69	69	95.7 (88.0-98.5)	
	70-79	37	97.3 (86.2-99.5)	
	80+	27	88.9 (71.9-96.1)	

DISCUSSION

Strengths and limitations The study included a large and, because we excluded patients with diabetes, existing HT and other cardiovascular conditions, homogenous cohort. Moreover, the data were collected during the normal practice of GPs, and reflect how they manage HT in daily care. We have no reason to assume that GPs participating in IPCI differ in their HT management from their non-participating colleagues; therefore, the conclusions may be generalized to the Dutch population. In the study we only studied recorded BP measurements and diagnoses. Especially diagnoses by medical specialists may not all be recorded by the GP. Therefore, registration bias is possible. All patients in our study have an immortal time of two years, which may introduce age related bias, as older patients have a shorter life expectancy and hence are less likely to be included in the cohort. Moreover, in general, diagnosis of HT is based on more than one measurement, which is not accounted for in our study. This may further explain why the percentages with a diagnosis of HT are rather low. A further limitation may be that this study does not permit any insight into the reason why older patients are less likely to be diagnosed as having HT. For our study we excluded patients with comorbidities such as DM and pre-existing cardiovascular disease. On the one hand this reduces the generalizability of the results. On the other hand, excluding patients with these co-morbidities eliminates these co-morbidities as potential confounders because, according to international guidelines, these patients should have strict BP control. By excluding these patients, it was easier to study the impact of age and BP on the outcomes. A strength of this study is that, by using reference SBP values we could control for the natural

increase of BP by age. As reference BP data for the older Dutch population were are not readily available, we used data from the North-western Europe population, which may be a limitation. In our cohort, mean BPs in all age strata were slightly lower than the used reference values [16]. This may be explained by the fact that we excluded patients already diagnosed with HT. Comparison with existing literature Although previous studies compared HT management in older to younger age groups [11, 12], to our knowledge, this is the first study to take age-specific SBP levels into account. The proportions of patients with a new diagnosis of HT were rather low and this seems in accordance with existing literature about guideline adherence [10]. However, our follow up period of one month does not allow conclusions about guideline adherence as some patients may receive the diagnosis of HT later on. Although we demonstrate that older patients are less likely to receive a diagnosis of HT, our data do not provide any insight why these patients are less likely to be diagnosed. A possible explanation may be the clinical condition, especially frailty in older patients as an important reason to refrain from treatment of HT [3, 9]. Other barriers to guideline compliance in older people are outside the scope of this study.

CONCLUSIONS

This study showed that GPs are less inclined to diagnose HT with increasing age, but do not withhold treatment when they diagnose HT in older patients. Increasing life expectancy will lead to larger numbers of older patients, yet the optimal management of HT in this age group has not been elucidated. In this respect there are indications that BP target values will depend on features, such as frailty, in older patients. More research, especially in the form of trials, will be needed to determine whether the Dutch GP's reservations to diagnose HT in older patients are correct.

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REFERENCES

1. Beckett NS, Peters R, Fletcher AE, Staessen JA, Liu L, Dumitrascu D, Stoyanovsky V, Antikainen RL, Nikitin Y, Anderson C, Belhani A, Forette F, Rajkumar C, Thijs L, Banya W, Bulpitt CJ, HYVET Study Group. Treatment of hypertension in patients 80 years of age or older. N Engl J Med. 2008;358(18):1887–98.
2. van Bemmel T, Gussekloo J, Westendorp RG, Blauw GJ. In a populationbased prospective study, no association between high blood pressure and mortality after age 85 years. J Hypertens. 2006;24(2):287–92.
3. Odden MC, Peralta CA, Haan MN, Covinsky KE. Rethinking the association of high blood pressure with mortality in elderly adults: the impact of frailty. Arch Intern Med. 2012;172(15):1162–8.
4. Bejan-Angoulvant T, Saadatian-Elahi M, Wright JM, Schron EB, Lindholm LH, Fagard R, Staessen JA, Gueyffier F. Treatment of hypertension in patients 80 years and older: the lower the better? A meta-analysis of randomized controlled trials. J Hypertens. 2010;28(7):1366–72.
5. Warwick J, Falaschetti E, Rockwood K, Mitnitski A, Thijs L, Beckett N, Bulpitt C, Peters R. No evidence that frailty modifies the positive impact of antihypertensive treatment in very elderly people: an investigation of the impact of frailty upon treatment effect in the HYpertension in the Very Elderly Trial (HYVET) study, a double-blind, placebo-controlled study of antihypertensives in people with hypertension aged 80 and over. BMC Med. 2015;13(1):78.
6. Fotherby MD, Harper GD, Potter JF. General practitioners' management of hypertension in elderly patients. BMJ. 1992;305(6856):750–2.
7. Wiersma T, Smulders YM, Stehouwer CD, Konings KT, Lanphen J. Summary of the multidisciplinary guideline on cardiovascular risk management (revision 2011). Ned Tijdschr Geneeskd. 2012;156(36):A5104.
8. Krause T, Lovibond K, Caulfield M, McCormack T, Williams B, Guideline Development Group. Management of hypertension: summary of NICE guidance. BMJ. 2011;343:d4891.
9. Mancia G, Fagard R, Narkiewicz K, Redon J, Zanchetti A, Böhm M, Christiaens T, Cifkova R, De Backer G, Dominiczak A. 2013 ESH/ESC Guidelines for the management of arterial hypertension. Eur Heart J. 2013. doi:10.1093/eurheartj/eht151.
10. Khatib R, Schwalm J, Yusuf S, Haynes RB, McKee M, Khan M, Nieuwlaat R. Patient and healthcare

provider barriers to hypertension awareness, treatment and follow up: a systematic review and meta-analysis of qualitative and quantitative studies. PLoS One. 2014;9(1), e84238.

11. Rodríguez-Roca GC, Pallarés-Carratalá V, Alonso-Moreno FJ, Escobar-Cervantes C, Barrios V, Llisterri JL, Valls-Roca F, Carrasco-Martín JL, Fernández-Toro JM, Banegas JR. Blood pressure control and physicians' therapeutic behavior in a very elderly Spanish hypertensive population. Hypertens Res. 2009;32(9):753–8.
12. Rodriguez-Roca GC, Llisterri JL, Prieto-Diaz MA, Alonso-Moreno FJ, Escobar-Cervantes C, Pallares-Carratala V, Valls-Roca F, Barrios V, Banegas JR, Alsina D. Blood pressure control and management of very elderly patients with hypertension in primary care settings in Spain. Hypertens Res. 2014;37(2):166–71.
13. Benetos A, Rossignol P, Cherubini A, Joly L, Grodzicki T, Rajkumar C, Strandberg TE, Petrovic M. Polypharmacy in the Aging Patient: Management of Hypertension in Octogenarians. JAMA. 2015;314(2):170–80.
14. van der Lei J, Duisterhout JS, Westerhof HP, van der Does E, Cromme PV, Boon WM, van Bemmel JH. The introduction of computer-based patient records in The Netherlands. Ann Intern Med. 1993;119(10):1036–41.
15. Vlug AE, van der Lei J, Mosseveld BM, van Wijk MA, van der Linden PD, Sturkenboom MC, van Bemmel JH. Postmarketing surveillance based on electronic patient records: the IPCI project. Methods Inf Med. 1999;38(4–5):339–44.
16. Lawes CM, Vander Hoorn S, Law MR, Elliott P, MacMahon S, Rodgers A. High blood pressure. Comparative quantification of health risks: global and regional burden of disease attributable to selected major risk factors. Geneva: World Health Organization; 2004. p. 281–390.
17. CCMO (Central Commitee on Research Involving Human Subjects): File research. http://www.ccmo.nl/en/file-research. Accessed 5 Jul 2016.

Medical Devices Access in Asian Countries: Sustainable Growth Trajectory in India

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ABSTRACT

Technologically advanced solutions for treatment of diseases, scientific rigor & research has seen tremendous growth in therapeutic usage of medical devices [1]. The role of 'Make in India' initiative becomes of utmost importance as a driving force for technological advancement of medical devices industry [2]. However, challenges exists & need to be addressed in providing affordable healthcare by producing medical devices that are cost competitive and effective to increased access [2]. Asian Countries like Japan, China and South Korea are foremost in the Medical devices sector [3].

This paper probes the sustainability of 'Make in India' policy with the growth trajectory of Asian countries in medical devices discusses; ways of overcoming challenges through regulations, policies and other stakeholders contribution.

Keywords- *Medical device, Make in India, Growth trajectory, Sustainable model.*

INTRODUCTION

Advanced technological solution has seen tremendous potential in therapeutic usage of medical devices [1]. Medical devices play a significant role in screening, diagnosing and treating patients as well as in restoring patients to normal lives. [2]. Globally, the medical device industry witnesses impressive growth and plays a vital role in the healthcare ecosystem reaching USD 520 billion by 2020 [2].

Since the last few decades, the Indian healthcare industry has seen improved growth scale with a greater need to better the quality of healthcare and provide affordable healthcare solutions as a result of which the medical device industry has also grown considerably. The compound annual growth rate (CAGR) of Indian medical device industry is around 15% of health **care as compared to CAGR of 4-6% of healthcare in other countries. E**ven though there is improved access and affordability of healthcare services, India faces high level of dependency on imports of medical devices [1].

Although Asian countries like Japan, China and South Korea are foremost in the Medical devices sector there is a sufficient opportunity in medical devices manufacturing and development of industries in India [2].

The Government of India's 'Make in India' initiative presents a platform for the medical device industries to revisit the operating model, identify key aspects for sustainability and explore possibilities for creating a transformative change in the medical devices sector. The role of 'Make in India' initiative has become the game-changer for technological advancement in the medical devices industry [3].

It therefore becomes necessary to probe the sustainability of 'Make in India' policy with the growth trajectory of Asian countries in medical devices and devise methods of overcoming challenges through regulations, policies and other stakeholder contribution.

GROWTH TRAJECTORY OF MEDICAL DEVICE MARKET IN ASIAN COUNTRIES

China - a leader in the Asian Market.

China's medical device market ranks second in the world. The driving force behind the growing market of medical devices in China is the increase in income and expanding population. By 2050, China will have 1.4

billion population above 60 years thereby increasing the demand of medical devices for these Chinese ageing baby boomers. A tremendous gap between urban and rural healthcare system in China exists, as well as between various types of hospital care. There is an inflow of huge number of population towards well-resourced and prominent healthcare centers in urban areas, due to poor health care systems in rural areas [5].

Chinese medical device market value is estimated around USD 11 billion in 2015. Chinese government needs to bridge the gap between quality healthcare and promote domestic manufacturing [5], as a result of which healthcare expenses is estimated to grow at 5.2% of the GDP in the next few years [6].

Market Challenges in China

Chinese government must revise and relook at the basic laws of foreign investment to ease investor influx and prevent the Medical Device sector growth trajectory from getting foiled by a robust regulatory framework. Infrastructure for small scale healthcare industries should be developed at grass root level, equitable access should be provided for basic healthcare services and Public Healthcare reforms must be implemented [5].

Developmental factors of China's Medical Device Market

China consists of state specific incentives, cheaper access to land and training subsidies to develop medical devices manufacturing base [1]. It will also facilitate establishment of electronic medical record system linked directly through medical devices thereby enabling smooth sharing and storage of patient's data especially in the remote areas, relieving overcrowding in the hospitals and shortening wait lists [5].

About 70% of advanced medical devices in China are exported from the European, American and Japanese markets that are in great demand in the hospitals especially in the private and tertiary care hospitals [7]. China possesses highly competitive and fragmented medical devices market [7]. One-third of China's med-tech market consists of medical equipment like x-ray, ultrasound and other imaging equipment [5].

Opportunities in China

With increase in per capita incomes, China's consumers are demanding more sophisticated and reliable medical devices. Ageing population, affordability to healthcare products and growing health care needs are the key growth drivers in China's medical device industries.

Restructuring and privatization of hospitals is the predominant motive in healthcare delivery in China. Doctors are rated according to the number of patients they treat as well as the research output they produce which is linked with the performance appraisals, salary and career advancement. A well-orchestrated coordination is provided for the physician-patient interaction through the use of digital solutions like mobile, social network, web, wireless devices, and physician portals [5].

Japanese invasion in the Medical Devices industry

Japan ranks third largest medical device market, having more ageing population driving the medical device manufacturing companies. Manufacturers have to follow Japanese Pharmaceutical Affairs Law to develop and market their products [4].

The Japanese medical devices market was approximately USD 32.5 billion in 2012, primarily dependent on import of sophisticated medical equipment with a whopping import size of approximately USD 7.4 billion from U.S.A. According to the American Medical Devices and Diagnostics Manufacturers' Association (AMDD), a trade association with Japanese operations enabled approval of 58% of "new medical devices" in Japan during the last 7-year period [4]. A 2.5% CAGR in Japan's medical device manufacturing is estimated by Espicom Business Intelligence from year 2013 to 2018 year [5].

Market Challenge in Japan

Factors affecting the degree of penetration in Japan's Market are the local competition, regulatory norms to be overcome, language and social factors, type of product, its quality & serviceability and commercial practices. Other factors affecting market entry in Japan includes level of competition between domestic manufactures and international players, import authorization necessities, restricted or banned imports, provisional entrance of goods, certifications, principles & classification requirements[5].

Market Opportunities in Japan

Japan's aging population and continuous demand

for advanced medical devices is the key determinant of vertical growth of Japan's medical device market. Domestic medical device production in Japan includes: diagnostic imaging tools; therapeutic and surgical kits; monitoring systems, home therapeutic equipment, dialyzers, and endoscopes. Some of the world's leading companies like Nipro, Toshiba Medical Systems, Hitachi Medico and Nihon Koden are some of the highest performing Japanese Medical Devices Companies. Most major U.S. and foreign medical device firms have an office in Japan or at least a Japanese official [5].

South Korean medical devices growth landscape

Korean medical devices market is third largest in Asia continent. In Korea, healthcare market is focused in five major cities of Seoul, Pusan, Daegu, Daejeon and Kwangju. These cities contain about 60% of Korea's hospital beds [8]. About 49.8 million are growing older thereby providing a good opportunity for medical device market headway [9]. The medical device market is estimated to be around USD 3.9 billion dollars and growing at an average rate of 13.5 % [10].

Opportunities in Korea

The Korean government aims to increase the medical device exports to achieve USD 12.5 billion growth by 2020 making a 3.8% contribution in the global markets. Korea presents unique opportunities for medical device companies due to a population of 49.8 million people who are growing older and whose average income is on the rise. Currently costly medical devices like digital X-ray, MRI, CT and ultrasound diagnostic systems are manufactured locally and are marketed in more than 50 countries in and around the world including USA and European nations [11]. Due to sophisticated technology and more features, Korean medical devices are in higher demand in the global market.

Challenges in Korea

Korea promotes electronics and medical engineering courses in its colleges and graduation schools. This has enabled them to possess huge number of technical experts spear heading the electro-medical equipment industry [11].

There has been a steep rise in the number of hospitals and medical equipment in Korea thereby creating huge number of local manufacturers. Highly sophisticated and reliable medical products of the Korean domestic manufacturers have made them worthy competitors in the overseas market landscape. The Korean domestic equipment industries perform continuous market monitoring in overseas as well as local markets [11].

Regulatory aspects of the growing Korean Medical Devices industry

Introduction of electronic filing system for medical devices and ease in tracing of the Medical Device- Korea Food & Drug Administration (KFDA) Commissioner has the right to track medical devices that possess critical risk for the human health are some regulatory parameters laid by the Korean government. Manufacturers in Korea recall medical devices that cause incurable serious adverse side effects or death [9].

INDIAN MEDICAL DEVICE ECOSYSTEM

Regulatory measures and medical device manufacturing policy decisions create a conducive atmosphere for large- scale manufacturing of products.

Challenges in the Indian Scenario

Indian medical devices industry follows outdated regulatory standards, which needs amendments and improvements. Indian manufactured products are substandard and give poor compliance, causing the Indian markets to have high level of dependency on medical devices exports. The Indian manufactured medical products are highly taxed and expensive with a lack of motivation from government to promote manufacturing. Poor tax incentives policy to encourage home grown manufacturing, inadequate funding policy from the government to sponsor innovation and lack of expertize in manufacturing high end quality medical products are the major challenges for the Indian Medical Devices industry [12].

Support from Indian Healthcare industry

The Indian medical industries must align themselves with the 'Make in India' initiative of the Indian government. Other stakeholders like healthcare providers and health insurers should also contribute and play their part in the Make in India plan and leverage Government policies and regulate the changes. Design and development of medical products with total customer satisfaction will lead to high quality creation, provide attractive solutions and generate cost effective innovations [13].

Backing from other sectors enabling growth of Medical devices

Indian insurance sector must provide wider coverage to both diagnostics and screening products. Local production will be enhanced by increasing the insurance over indigenously manufactured devices. Industry – academia interface must be enhanced to foster research, consultancy, entrepreneurship and innovation in medical devices industry. Associative work between industry and academia will enable exchange of ideas, facilitate partnerships, fragmentize and regulate the manufacturing process [13].

Sr. No.	Countries	Public healthcare expenditure as a % of GDP	Population size
1	India	1.407	1.31 billion
2	China	3.09	1.37 billion
3	Japan	8.55	126.96 million
4	South Korea	3.98	50.62 million

Table 1: GDP and Population size between the four giants of Medical devices countries [14].

STRATEGIES AND SUSTAINABLE GROWTH MODEL FOR INDIA FROM ASIAN COUNTRIES

State specific incentives can be started similar to China to develop a medical devices manufacturing base that includes economical production of high gain medical devices. Provision of cheaper access to land and training subsidies will greatly motivate new entrants in the medical devices manufacturing sector. Use of high tech & sophisticated technologies like telemedicine and the use of digital solutions like wireless devices and physician portals will enhance the quality of healthcare delivery system. The medical devices market should be well structured and organized. It should promote research and innovation in the medical devices manufacturing sector.

India must aim for having world-class manufacturing facilities similar to that in Japan. India should promote generation of technical expertise in electro-medical equipment manufacturing similar to Korea to manufacture highly refined and reliable medical products.

SUSTAINABLE GROWTH MODEL FOR INDIAN MEDICAL DEVICES INDUSTRY

Amendments in policy and strategic implementation of regulatory mechanism can bring about tremendous opportunities for the MNCs and local companies in India. The changes in the regulatory design will attract more investment and bring technological upgradation in the medical devices industries. Technological collaborations between MNCs and domestic associates can leverage their product's reach in the market and domestic manufacturers can explore contract-manufacturing setting up international standards of infrastructure, enabling India to become a global center for medical devices manufacturing in the world [15].

Financial measures must be taken to develop and nurture the emerging medical device-manufacturing ecosystem to attract investors. Provision of Duty credits on import of raw materials for medical device manufacturing and a favorable government policy to introduce concession on VAT for imported equipment will act as an enabling environment for Medical devices growth in India.

Superior segment manufacturing and incentivizing of low to medium technology products will create a conducive environment for large-scale medical device manufacturing. Low and medium technology products that can be incentivized may include disposables, consumables, certain imaging equipment, implants, stents, some categories of laboratory diagnostics equipment and innovative eHealth based solutions [12].

Indian Government should promote and make policies that are conducive to a macro - economic environment for medical device manufacturing. The Indian government through Make in India initiative must achieve 100% foreign direct investment for Greenfield and brownfield entries. Low and middle level companies should be partnered with giants in medical device manufacturing firms and supported well to manufacture efficient and reliable medical devices and flourish in the market [16].

Strong bonding between the customer and the seller should be established to have good sales and marketing. Apart from sales and marketing, installation, servicing and maintenance of the medical devices should be

done efficiently and regularized well. Accuracy and efficacy of screening and diagnosis should be improved. Portable diagnostic devices should be manufactured on a larger scale to meet the demands of homecare and remote locations. Advanced sophisticated assistive and rehabilitation devices that would reduce the healing time and restore patients to healthy state should be produced by Indian manufacturers. Homecare screening devices for early detection of diseases should be produced on a larger scale [12].

CONCLUSION

The traditional US and western European markets are under regulatory scrutiny and pricing pressure providing the Asian markets an opportunity to leverage accessibility in medical devices. The Indian medical devices market is fourth in Asia after Japan, China & South Korea [2]. Best practices in these countries in terms of access to health care services, fast track approach, tax holidays, can be adopted by India and design a holistic ecosystem for medical devices for sustainable growth.

Leveraging 'Make in India' initiative for medical devices and incorporating best practices of the Asian giants in medical devices will provide local innovation and make India a global center for medical device manufacturing.

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REFERENCES

1. Medical Devices | Deloitte India Report | Life Sciences & Healthcare. (2016). Available at https://www2.deloitte.com/in/en/pages/life-sciences-and-healthcare/articles/medical-devices-making-in-india.html,accessed on December 31, 2016.
2. Analysis of Korean Medical Device Practice, April 2011, Institute for testing & certification (ITC). Available at www.asiaitc.com/download/article/TFDA_Seminar/4.pdf, accessed on December 31, 2016.
3. Sanjana, P., Kirti, H., & Begum, A. S. (2016). Medical Devices And Their Approval Procedure In India. International Journal of Drug Regulatory Affairs, 4(3), 19-29. Available at digital object identifier (doi):10.22270/ijdra.v4i3.186, accessed on December 31, 2016.
4. Sealey, S., Edathodu, A., & Mukku, S. (2014). Medical Devices in Japan – A Market Access Labyrinth? Value in Health, 17(3). Available at digital object identifier (doi):10.1016/j.jval.2014.03.073, accessed on December 31, 2016.
5. MAINE International Trade Center Report, Global Resource Local Expertise China, September 2013.
6. Nishith Desai Associates Report - Legal & Tax consulting worldwide - "The Indian medical device Industry-Regulatory, legal and tax overview", April 2016.
7. Markus, "Medical Device Market in China: Opportunities and Challenges",Blog, 27. April 2015.Available at https://wilddesign.de/blog/en/medical-device-market-in-china-opportunities-and-challenges-2/, accessed on December 31, 2016.
8. The Korean Medical Device Market: Asia's Third Largest. (n.d.). Available at http://www.pacificbridgemedical.com/publication/the-korean-medical-device-market-asias-third-largest/,assessed on March 30, 2017.
9. Seth J. Goldenberg, Yongha Na, "The Medical Device Industries in Korea; Strategies for Market Entry" (2014) available at https://www.namsa.com/wp-content/uploads/2015/10/WP-Medical-Device accessed on March 20, 2014
10. Medical Device Market in 2016: New Opportunities in Asia Pacific (2016). Available at http://blog.euromonitor.com/2016/02/medical-device-market-2016-opportunities-in-asia-pacific.html, accessed on December 31, 2016.
11. Indian Health care Industry Analysis -India brand equity foundation. Available at http://www.ibef.org/industry/healthcare-presentation accessed on December 31, 2016.
12. Infosys Consulting Report, "Indian Medical Device Industry- Current state and opportunities for growth" (2015), available at https://www.infosys.com/consulting/insights/pages/indian-medical-device-industry.aspx, accessed on March 27, 2017.
13. Medical Devices | Deloitte India Report | Life Sciences & Healthcare. (2016). Available at https://www2.deloitte.com/in/en/pages/life-sciences-and-

healthcare/articles/medical-devices-making-in-india.html, accessed on December 31, 2016.

14. World Health Organization Global Health Expenditure database, "Health expenditure, total (% of GDP)", available at http://data.worldbank.org/indicator/SH.XPD.TOTL.ZS, accessed on December 31, 2016.
15. Center for Devices and Radiological Health, "Classify Your Medical Device - Is the Product a Medical Device?" available at http://www.fda.gov/medicaldevices/deviceregulationandguidance/overview/classifyyourdevice/ucm051512.htm, accessed on March 27, 2017.
16. Chakravarthi I. Medical Technology – "Medical Equipment Industry In India: Production,
17. Procurement and Utilization & Tracing Policy Approaches", Indian J Public Health 2013; 57, 4: 197-207.

HIV Risk among Labor Migrants: An In-Depth Study of the Literature

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ABSTRACT

Background: This study aimed to identify multilevel strategies associated with HIV risk among labor migrants.

Method: An extensive literature review from the global data base such as PubMed, google scholar and EBSCO were searched by using key words in various combination such as AIDS, HIV, migration, mobility, migrants and labor migrants.

Results: The review of the present study was revealed that the HIV risk among labor migrants was associated with multilevel determinants. These are of socio-demographic variables, components of knowledge factor, life style and sexual practices. The socio-demographic determinants associated with HIV risk were: age, education, income per month, marital status, pre-and extra marital sex, and cultural norms. The determinants of knowledge factor frequently associated with HIV risk were: awareness towards HIV/AIDS, perspective and perception towards HIV/AIDS and limited condom use. The determinants of lifestyle component most often linked to HIV risk were: history of migration, exposure to pornography and peer influence. Sexual practices frequently related to elevated HIV risk were: sex with commercial sex workers, sex with casual unpaid partners and men having sex with men.

Conclusion: The result findings across labor migration necessitates the need for multilevel intervention strategies. Also, additional research is required to inform the policy maker and administrator towards development, implementation and evaluation of multilevel intervention that overlaid the prior methodological limitation and build new tailored interventions.

Keywords: *HIV, AIDS, HIV risk, migration, labor migration, migration factors*

BACKGROUND

The 2017 UNAIDS data estimated that in 2016, 36.7 million people were living with HIV and 1.8 million people were newly infected with HIV[1]. With the continuous growth of the epidemic, migrants are considered a high risk to HIV infections[2]. The World Migration Report 2018 estimated around 244 million international migrants in the world and they remitted around USD 429 billion in 2016 in low-and middle-income countries[3]. There has been a move from individual HIV risk behaviour to multilevel as caused by cultural, social, political and economic determinants. For example, HIV scholars have pointed that understanding of HIV risk through ecological models[4] and social vulnerability[5]. Such approaches have helped researchers in understanding HIV risk among labour migrants. Labour migrants are particularly stayed away from their families and spouses and engaged in markets, mines and fields. They are forced to do dangerous and demanding jobs for low wages, living with unfavourable environments and have limited access to health care. They face limited social network support, forced to adapt

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foreign culture, customs and cultures. These factors may impact to increase HIV risk among labor migrants as well as other vulnerable populations.

It has not been fully understood the HIV transmission pathways in labor migrants, but the burgeoning literature both in social and health science examining various issues of migrant's population[6,7,8]. Until now, HIV risk among labour migrants has not been thoroughly studied. Therefore, this study tries to look with a multidisciplinary approach[9] for potential determinants that could be used to formulate multilevel interventions for communities, institutions, families, couples and individual. This comprehensive review identified four categories of evidence based multilevel determinants that represents the association between HIV risk and labor migration. These were: (1) socio-demographic; (2) knowledge; (3) life style; (4) sexual practices. It also represents gaps and limitations in previous studies and offer recommendations for future research.

SEARCH METHOD

The relevant English data base such as PubMed, EBSCO and google scholar were examined for articles by using key words in various combination: AIDS, HIV, migration, mobility, migrants and labor migrants. All reviewed articles reference section was also studied to find additional articles. The author acknowledges that despite of extensive literature search some of the pertinent articles might have been omitted, especially to those labor migrants who occasionally represented by particular occupations (e.g. seafarers, truck drivers). About 116 research papers were included in this study.

Inclusion and exclusion criteria

The labor migrants in this study, defined as: individuals who leave their native place (home location) and move for a short period (temporarily) to a different location (both in-side and out-side of country) to engage in salaried activity with the intention of returning to their native place again. Thus, only articles that directly linking with labor migration and HIV/AIDS were included. The permanent immigrants were excluded from the study as they do not have intention to return back to their native home location. Further, asylum and refugees were excluded in the study though they act as a forced migration and may associated with distinct risk but may not likely to come back their home location. The articles published between 1989 to 2017 and written in English language were included in the study.

Multilevel determinants

While reviewing the literature from various data base, a comprehensive list of multilevel determinants gathered that are linked to HIV risk were established and categorized into the four groups: (1) socio-demographic; (2) knowledge; (3) life style; (4) sexual practices.

RESULTS

Socio-demographic determinants

Young people are centre of HIV/AIDS epidemic and are disproportionately affected by it[10] . Every day, approximately 3000 new HIV infections occur among young people, aged between 15-24 and this population account for more than one-third of all new HIV infections[11]. A study conducted in China, based on the nationwide 1% population sampling survey in 1995, it was found that 86% of labor migrants were between 15 and 65 years of age and 75% were between 15 and 34 years of age[12].

Limited studies found that age at sexual initiation associated with HIV risk for labor migrants. Previous studies in China, Nepal, Kenya and South Africa demonstrated that an association between early age at sexual initiation and multiple sex partners[13,14,15,16]. Unprotected sexual intercourse within last three months and frequent cigarette smoking were more prevalent among young labor migrants than with elder migrants[13]. Similarly, another study among Mexican labor migrants in the US showed that migrants from the youngest age group (18-29 years old) particularly have elevated risk behaviours such as sex with a commercial sex worker, sex while under the influence of alcohol or drugs and sex with a male partner[17]. A research carried out by Population Council in four high HIV prevalence states of India on migration/mobility patterns among male workers and their links with HIV risk found that almost 70% of male labours are young between 18 to 29 years, more than half of a young labours are married and resides away from their wives because of work. Further reports suggest that nearly 31% have intercourse with either sex workers or non-spousal unpaid female partners in source places in past 2 years[18] . Also, labor migrants with only primary education and higher incomes were more likely to engage risky behaviour[19]. Further, a study of migrants in Shanghai, 12% of migrants were educated to high

school or college level, 48% to secondary school level, and 28% to primary school level, with remaining 9.1% of migrants being illiterate or semi-illiterate[20]. Marital status has also been found to be a significant predictor of vulnerability to HIV/AIDS among migrant workers. A study conducted in Myanmar showed that respondents, who were single, divorced or separated, visited sex workers more frequently than married labor migrants[19]. Another study in China showed that being married was associated significantly with increased HIV risk behaviors[21]. Also, an ethnographic study on migration and HIV transmission have conducted in Northern Karnataka have found that nearly 35% of married labor migrant men were involved in extramarital sex whereas around 40% of unmarried men were engaged with premarital sex[22].

In-depth investigation has also revealed that socio-cultural environment played a crucial role in men's sexual behaviour. Various factors that affect men's sexual behaviour include community norms and practices[23,24] gender roles and inequalities[23,25] stigma and discrimination[23,26] and low education status[27]. Research in different settings argues that those who ignore social, cultural norms and gender inequality experiences different types of sexual interactions such as types of sexual relationship (non-spousal/premarital/transactional), the frequency and opportunities for sexual contact and condom use[22,26,28,29]. Further, rigid traditional gender norms allow men greater freedom for sex, more mobility and opportunity for engaging with multiple sexual partnerships[30].

Knowledge factor determinants

Most studies have documented lack of knowledge about HIV/AIDS among labor migrants that closely linked with HIV-related risk behaviours. Most migrant workers had inadequate HIV/AIDS knowledge despite health education campaigns. For example, in Russia, male labor migrants from Eastern Europe and Central Asia were asked eight-item assessment of HIV/AIDS knowledge. These migrants, on average, scored only 3.6 items correctly[31]. Further, 45% of migrants felt that oral contraceptive and IUDs could prevent HIV infections. A study among Mexican migrant laborers' on knowledge about HIV transmission showed that the migrants had higher knowledge on major modes of transmission, whereas there was misconception that HIV contracting through AIDS testing, public restrooms and mosquito bites[32]. Some migrants believed that AIDS is a diseases of drug addicts and homosexuals and personal appearance could tell whether person is infected with HIV or not. Also, Burmese labor migrants in Thailand were given a knowledge assessment on HIV prevention, transmission and associated risk factors, the total score was 36, 41 and 82% respectively[33]. Male participants scored higher than female migrants in all scales and the level of HIV/AIDS knowledge increased with addition of each year education level. Further, some literatures documented that labor migrants had low knowledge on HIV. For example, one study in China showed that only 37% of labor migrants had knowledge that condom usage could prevent HIV transmission and 38% knew that antibiotics use could not prevent HIV infection[13].

Limited condom use is associated with high HIV risk among labor migrants. It is mainly associated with difficulty in obtaining condom, health beliefs, various cultural norms and practices and impaired judgements. A study in South Africa stated that the migrant mine workers reported of using very limited condom despite of free supplies[34,35]. In Moscow, the tajik labor migrants reported of engaging unprotected sex due to various reasons: they did not carry condom when they were drunk, using condom during sex decrease sexual pleasure and obstacles in getting condoms due to unidentified status in the city[36]. The Mexican labor migrants in the USA reported that the lack of knowledge prevails them to know accurate use of condom. About less than fifty percent of these migrant men had always protected sex with occasional partners, whereas about a third had unprotected sex[32].

Life style determinants

It is widely believed that environment of an individual brings profound influence to his/her behaviour. For example, when an agricultural worker (farmer) migrated to an urban life style which is greatly different from rural environment, we cannot be guaranteed that his/her sexual behaviour was changed/affected by the current living life style. Therefore, it is important to understand the potential predictors that affect HIV risk due to migration. These factors may include migration history (total duration living in the city after migration, place of initiation and continuation of sex work etc) exposure to pornography, peer influence and other socio-demographic characteristics coupled with knowledge, attitude and perception which has been explored in other

literatures[37,38,39].

Migration History

Migrant worker's frequency of a visit to their families in native country has a significant association with HIV-related risk behaviour. Labor migrants, who lived away from their native land for prolonged periods tend to have increased HIV-related risk behaviours. A comparative cross-sectional study carried out in three rural communities of West Africa found an association between higher mobility and increased HIV-related risk behaviours. Furthermore, condom use was found least, where mobility was greatest[40]. The few studies conducted among male labor migrants in China demonstrated that sexually transmitted diseases (STDs) were significantly associated with the high frequency of visiting home[41].

Peer influence and Pornography exposure

Studies documented that peer influence occupies an important role increasing the likelihood of risky sexual behaviour leading to HIV risk among labor migrants. A study in Shanghai, China reported that, the respondents who had peers engaging in sex with a non-regular sex partner were 4.4 times more likely to be involved in risk behaviour than were those who did not engage[42]. Another study in Metema district, northeast Ethiopia documented that seasonal migrant worker's social environment such as peer influence can lead to HIV risk[43].

Past research from developed countries suggested that exposure to pornography is associated with increased acceptance of premarital and extramarital sex including paid sex[44,45,46,47,48]. A recent research in United States among adults has shown that individuals who had visited sexually explicit websites were twice more likely to have multiple sexual partners than their counterparts[44]. Another study which looked into different aspects of pornography exposure historically from 1973-2010 also found a positive association with multiple sexual partners and paid sex[47].

Sexual practices determinants

Evidence suggests that male labor migrants are more likely to engage HIV risk than non-migrants. For instance, women with a migrant husband are twice more prone to HIV positive than a non-migrant husband[49]. A study of labour migrants in Moscow reported a majority of migrants having unprotected sex with commercial sex workers[36]. In Durham, North Carolina, a study conducted among Hispanic migrants, 22% respondents stated that they had visit sex workers in the previous year. These migrants reported, on average, about 6.7 sex worker visits per year[50]. A study in Tajik migrant workers in Moscow reported that all participants did not use condom while sex with commercial sex workers[36] .

Studies have demonstrated that casual unpaid partner (such as relatives, neighbours and friends) influences the HIV risk among migrants at place of origin. A study conducted in Azamgarh and Prakasam districts in India reported that in Prakasam district, the migrant workers were engaged sex with a casual unpaid partner more than the Azamgarh district[51]. Having multiple sexual partner are associated with risky HIV behaviour. Long time away from their regular partner/spouse and lack of social control at home environments, labor migrants often engaged sex with multiple sexual female partners at destination areas. About less than one third percent (30%) of Eastern European and Central Asian migrant workers in Russia were stated engaging sex with multiple sexual female partners in last 3 months[31]. Comparing with Nepali migrant workers who travelled to India with non-migrants, the study showed that around 49% of migrants were reported having multiple female partners in last five years whereas it was only 25% for the non-migrants during the same period[52]. The recent labor migrants of rural Tanzania who had more than two partners in last 12 months was 24% whereas for non-migrants it was only 11%[53].

Men having sex with men also cause increased risky sexual behaviour. A study among Mexican labor migrants in New York city, USA stated that four male migrants ever had sex with men out of total 50 male migrants[54]. In another study among Latino labor migrants those who seek day labour jobs in the USA, the study concluded that 38% of male migrants solicited for sex by a male partner, while only 9% of those engaging sex with the solicitor[53]. Further, another study in California among Mexican labor migrants, about 37% of migrants had reported sex with male in last three months[55]. The study concluded that these male migrants had averaged 11 sexual partners in last 2 months in comparison with non- men sex with men.

DISCUSSION

The review of the present study was revealed that the HIV risk most frequently related to multilevel

determinants at different levels of socio-demographic variables, components of knowledge factor, life style and sexual practices. The socio-demographic determinants related to HIV risk were: age, education, income per month, marital status, pre-and extra marital sex and cultural norms. The determinants of knowledge factor frequently associated with HIV risk were: awareness towards the HIV/AIDS, perspective and perception towards HIV/AIDS, and limited condom use. The determinants of lifestyle component most often associated with HIV risk were: history of migration, exposure to pornography and peer influence. Sexual practices were most often related to HIV risk were sex with commercial sex workers, sex with casual unpaid partners and men having sex with men.

To understand how migrant labor differ in prone to HIV risk from other susceptible communities, additional exploration is required in the development, execution, and evaluation of multilevel interventions. The review findings represent a couple of specific ways in which the present body of knowledge is inadequate because of methodological confinements of various current studies and offer solutions towards its improvement. One, sometimes there is occasion where a lack of consistency in how investigators perceived labor migration from various sorts of migration. This could be improved through by adopting rigorous systematic approach on criteria and definition made for labor migration.

Two, with respect to gender, HIV risks among female migrant labors are more, is also less studied. Hence, the risk of HIV in female migrant labor ought to be investigated. For instance, Lin[56] stated that HIV risks were higher in female migrants because of intoxication and Deonar stated that HIV risk among women were higher because of less self-efficacy[55]. Other studies have been reported that the some female migrant labor engaged in transactional sex or commercial sex work in order to survive[57,58.]

Three, most of the studies used sample qualitative data, non-probabilistic samples or independent variables with narrow range, and many of these studies do not intend to assess the strength of risk factors through a systematic phenomenon. Research designs could be more rigorous to achieve possible cross study comparisons that could overcome the constraints of mobility and undocumented status of labor migrants. There is a more need and key attention to document the HIV prevalence data through a wide variety of systematic phenomenon such as probabilistic sampling, subgroups of migrants within the specified samples, independent variables/factors with broader range, and collection of more biological samples. Furthermore, to investigate the whole migration process, longitudinal studies are needed that could encompass the sites of source, transit, destination and return[59].

Four, mixed method approach with proper quantification and statistical analysis could be helpful in assisting in better and comprehensive understanding of the multilevel determinants of HIV/AIDS and labor migration[60]. Also, qualitative and ethnographic study may add better understanding in sociocultural and policy context. Future studies should be focused on implementation challenges in research like: how best to communicate with migrant labors through digital technology and how to deal with the problems of policymakers, implementers and community leaders. The later emphasize on community participation that could lead the development and implementation of community based research activities[61].

Five, lack of investigation on protective factors have been found among labor migrants for HIV risk infection. Several studies[62,63,64] have been reported that labor migrants had high HIV risky behaviours, but their condom use is more and they are likely to be tested for HIV infection. But the protective factors are more broadly perceived across four categories of determinants. Kissingers study revealed that in a social organization such as church related group was linked with fewer female sex workers visit and condom use found consistent in Latino labor migrations of New Orleans[65]. Whereas Saggruti study revealed that the migrants who lives with their wives had lesser risky sexual behaviour in Mumbai, India[66]. Wide variety of approaches should need to study and focus on protective factors that consider strengths and resources of an approach[67,68] focused on individual, group, family, socio-cultural norms, values, beliefs which are corelated with protective behaviours of HIV and preventive intervention strategies.

In conclusion, there are new concerns such as migration and HIV/AIDS to be studied, which includes HIV testing attitudes amongst the migrants[69], HIV positive status due to migration[70], and delays in testing of HIV/AIDS in migrants[71]. Further, other issues among labor migrants and their families such as barriers and access to ART treatment, adherence and prevention of

HIV from mother to child transmission to be studied.

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REFERENCES

1. UNAIDS data 2017: UNAIDS. 2017. Available from: http://www.unaids.org/sites/default/files/media_asset/20170720_Data_book_2017_en.pdf [Last accessed on 23 December 2017].
2. HIV and International Labour Migration: UNAIDS Policy Brief. UNAIDS; Geneva: 2008.
3. International Organization for Migration (IOM): 2018. World migration report 2018. Available from: https://publications.iom.int/system/files/pdf/wmr_2018_en.pdf [Last accessed on 23 December 2017].
4. Waldo CR, Coates TJ. Multiple levels of analysis and intervention in HIV prevention science: exemplars and directions for new research. AIDS. 2000; 14 (Suppl 2): S 18 – 26.
5. Parker RG. Empowerment, community mobilization and social change in the face of HIV/AIDS. AIDS. 1996; 10(Suppl 3): S27 – 31.
6. Decosas J, Kane F, Anarfi JK, Sodji KD, Wagner HU. Migration and AIDS. Lancet. 1995; 346(8978):826-8.
7. Wolffers I, Fernandez I. Migration and AIDS. Lancet. 1995; 346(8985):1303.
8. UNAIDS. Population mobility and AIDS. UNAIDS technical update. UNAIDS; Geneva: 2001.
9. Organista KC, Carrillo H, Ayala G. HIV prevention with Mexican migrants: review, critique, and recommendations. J Acquir Immune Defic Syndr. 2004; 37(Suppl 4): S227-39.
10. UN (2003). World youth report: HIV/AIDS and young people. (No.ST/ESA/287). New York, USA; United Nations Publication.
11. Avert (2013). HIV/AIDS and vulnerable groups. Retrieved March 26, 2015, from http://www.avert.org/hiv-aids-vulnerable-groups.htm
12. He N, Wong FY, Huang ZJ, Ding Y, Fu C, Smith, BD et al. HIV risks among two types of male migrants in shanghai, china: money boys vs. general male migrants. AIDS (London, England). 2007; 21 Suppl 8,S73-9.
13. He N, Detels R, Chen Z, Hua X, Jiang Q, Zhu J, et al. Sexual behaviour among employed male rural migrants in Shanghai, China. AIDS Education and Prevention. 2006; 18, 176-185.
14. Puri M and Cleland J. Sexual behaviour and perceived risk of HIV/AIDS among young migrant factory workers in Nepal. *The journal of adolescent health*: Official publication of the society for adolescent medicine. 2006; 38(3), 237-246.
15. Brockerhoff M and Biddlecom AE. (1999). Migration, sexual behaviour and the risk of HIV in Kenya. International migration review.1999; 33(4), 833-856.
16. Zuma K, Lurie MN, Williams BG, Mkaya-Mwamburi D, Garnett GP, Sturm AW. Risk factors of sexually transmitted infections among migrant and non-migrant sexual partnerships from rural South Africa. Epidemiology and Infection. 2005; 133(3), 421-428.
17. Sanchez MA, Hernandez MT, Hanson JE, Vera A, Magis-Rodriguez C, Ruiz JD, et al. The effect of migration on HIV high-risk behaviors among Mexican migrants. Journal of Acquired Immune Deficiency Syndromes.2012; (1999), 61(5), 610-617.
18. Saggurti N, Verma RK, Jain A, RamaRao S, Kumar KA, Subbiah A, et al. HIV risk behaviours among contracted and non-contracted male migrant workers in India: Potential role of labour contractors and contractual systems in HIV prevention. AIDS (London, England),2008; 22 Suppl 5, S127-36.
19. Htun NSN. HIV/AIDS risk behaviours among Myanmar migrants in Bangkok, Thailand (Unpublished Master's Thesis). 2008; Chulalongkorn University, Bangkok. Thailand.
20. Yang H. Trend and projection of the development of migrant population in Shanghai. Population journal.1995; 2: 31-35.

21. Li X, Fang X, Lin D, Mao R, Wang J, Cottrell L. et al. HIV/STD risk behaviors and perceptions among rural-to-urban migrants in China. AIDS Education and prevention: official publication of the International Society for AIDS Education. 2004; 16(6), 538-556.
22. Halli SS, Blanchard J, Dayanand GS, Moses S. Migration and HIV transmission in rural South India: an ethnographic study. Culture Health & Sexuality. 2007; 9(1):85-94.
23. McCreary LL, Kaponda CP, Norr KF, Jere DL, Chipeta CH, Davis KK et al. Rural Malawians' perceptions of HIV risk behaviours and their sociocultural context. AIDS Care.2008; 20, no 8:946-57.
24. Soskolne V and Shtarkshall RA. Migration and HIV prevention programmes: linking structural factors, culture, and individual behaviour–an Israeli experience. Social Science Medicine. 2002;55(8):1297-1307.
25. Gupta GR. How Men's power over women fuels the HIV epidemic. BMJ. 2002; 324, no.7331:183-4.
26. Nguyen VH, Dunne MP, Debattista J, Nguyen TH, Dao TM. Social Contexts of Risk Behaviors for HIV among Male, Unskilled, Unregistered Laborers in Urban Vietnam. Qualitative Health Research. 2012; 22, no. 7: 871–9.
27. Ordo´n˜ez CE and Marconi VC. Understanding HIV Risk Behavior from a Sociocultural Perspective. AIDS and Clinical Research 2012; 3: e108.
28. Parker R. Sexuality, Culture, and Power in HIV/AIDS Research. Annual Review of Anthropology. 2001; 30, no. 1: 163–79.
29. McMillan K and Worth H. The Impact of Socio-Cultural Context on Young People's Condom Use: Evidence from Two Pacific Island Countries. Culture, Health & Sexuality. 2011; 13, no. 3: 313–26.
30. Gupta GR. Gender, Sexuality, and HIV/AIDS: The What, the Why, and the How. Canadian HIV/AIDS Policy & Law Review. 2000; 5, no. 4: 86–93.
31. Amirkhanian YA, Kuznetsova AV, Kelly JA, Difranceisco WJ, Musatov VB, Avsukevich NA et al. Male labor migrants in Russia: HIV risk behaviour levels, contextual factors and prevention needs. Journal of Immigrant and Minority Health/Centre for Minority Public Health. 2011, 13 (5),919-928.
32. Organista KC, Organista PB, Garcia De Alba JE, Castillo Moran MA, Carrillo H. AIDS and condom-related knowledge, beliefs, and behaviors in Mexican migrant laborers. Hispanic journal of behavioural sciences. 1996;18(30, 392-406.
33. Mullany LC, Maung C, Beyrer C. HIV/AIDS knowledge, attitudes and practices among Burmese migrant factory workers in Tak province, Thailand. AIDS Care.2003; 15(1), 63-70.
34. Macheke C and Campbell C. Perceptions of HIV/AIDS on a Johannesburg gold mine. South African Journal of Psychology. 1998; 28 (3), 146-153.
35. Campbell C. Migrancy, masculine identities and AIDS: The psychosocial context of HIV transmission on the South African gold mines. Social science & Medicine. 1997; 45(2), 273-281.
36. Weine S, Bahromov M, Mirzoev A. Unprotected Tajik male migrant workers in moscow at risk for HIV/AIDS. Journal of Immigrant and Minority Health/Centre for Minority Public Health. 2008; 10(5),461-468.
37. Anderson, A.F., Qingsi, Z., Hua, X., & Jianfeng, B. China's floating population and the potential for HIV transmission: A social-behavioral perspective. AIDS Care.2003; 15(2), 177-185.
38. Chirwa WC. Migrant Labor, Sexual Networking and Multi-partnered Sex in Malawi. Health Transition Review. 1997;3, no. suppl 7:5-15.
39. Hu Z, Liu H, Li X, Stanton B, Chen X. (2006). HIV-related sexual behaviour among migrants and non-migrants in a rural area of China: role of rural-to urban migration. *Public Health*; 120(4):339-345.
40. Sudhinaraset M, Astone N, Blum RW. Migration and unprotected sex in Shanghai, China: Correlates of condom use and contraceptive consistency across migrant and non-migrant youth. *The Journal of Adolescent Health*: Official publication of the Society for Adolescent Medicine. 2012. 50(3 Suppl), S68-74.
41. Liu H, Li X, Stanton B, Liu H, Liang G, Chen X et al. Risk factors for sexually transmitted disease among rural-to-urban migrants in China: Implications for HIV/sexually transmitted disease prevention. AIDS Patient Care and STDs. 2005, 19(1), 49-57.
42. Wang KW, Wu JQ, Zhao HX, Li YY, Zhao R,

Zhou Y. Unmarried male migrants and sexual risk behaviour: a cross sectional study in Shanghai, China. BMC Public Health.2013; 13:1152.

43. Tirunen K, Waise B, Gonzalez H. Sexual behaviour and vulnerability to HIV infection among seasonal migrant laborers in Metema district, northwest Ethiopia: a cross-sectional study. BMC Public Health. 2015; 15:122 DOI 10.1186/s/2889-015-1468-0.
44. Braun-Couville DK and Rojas M. Exposure to sexually explicit websites and adolescent sexual attitudes and behaviors. The Journal of Adolescent Health.2009; 45: 156-162.
45. Brown JD and Kelly LE. X-rated: Sexual attitudes and behaviors associated with US. Early adolescents' exposure to sexually explicit media. Communication Research, 2008; 36: 129-151
46. Lo VH and Wei R. Exposure to internet pornography and Taiwanese adolescent's sexual attitudes and behaviour. Journal of Broadcasting & Electronic Media.2005; 49:221-237.
47. Wright PJ. US males and pornography, 1973-2010: Consumption, predictors, correlates. Journal of Sex Research. 2011; 50:60-71.
48. Puri M and Cleland J. Sexual behaviour and perceived risk of HIV/AIDS among young migrant factory workers in Nepal. The journal of adolescent health: Official publication of the society for adolescent medicine.2006; 38(3), 237-246.
49. Saggurti N, Mahapatra B, Sabarwal S, Ghosh S, Johri A. Male Out-Migration: A Factor for the Spread of HIV Infection among Married Men and Women in Rural India. PLoS ONE. 2012; 7, no. 9: e43222.
50. Parrado EA and Flippen C. Community attachment, neighbourhood context, and sex worker use among Hispanic migrants in Durham, North Carolina, USA. Social Sciences & Medicine.2010; 70 (7), 1059-1069.
51. Saggurti N, Mahapatra B, Swain SN, Jain AK. Male Migration and Risky Sexual Behavior in Rural India: Is the Place of Origin Critical for HIV Prevention Programs? *BMC Public Health*. 2011;11(6): S6.
52. Podel KC, Okumura J, Sherchand JB, Jimba M, Murakami I, Wakai, S. Mumbai disease in far western Nepal: HIV infection and syphilis among male migrant-returnees and non-migrants. Trop Med Int Health. 2003; 8(10): 939-9.
53. Galvan FH, Ortiz DJ, Martinez V, Bing EG. Sexual solicitation of Latino male day laborers by other men. Salud publica mex.2008; 50(6):439-446.
54. Munoz-Laboy M, Hirsch JS, Quispe-Lazaro A. Loneliness as a sexual risk factor for male Mexican migrant workers. American Journal of Public Health. 2009, 99 (5), 802-810.
55. Denner J, Organista, KC, Dupree JD, Thrush, G. Predictors of HIV transmission among migrant and marginally housed lations. AIDS Behav. 2005; 9(2): 201-10.
56. Lin D, Li X, Yang H, Fang X, Stanton B, Chen X, et al. Alcohol intoxication and sexual risk behaviors among rural-to-urban migrants in China. Drug Alcohol Depend. 2005; 79(1):103-12.
57. Chapman J, Estcourt CS, Hua Z. Saving 'face' and 'othering': getting to the root of barriers to condom use among Chinese female sex workers. Sex Health. 2008; 5(3):291-298.
58. Munyewende P, Rispel LC, Harris B, Chersich M. Exploring perceptions of HIV risk and health service access among Zimbabwean migrant women in Johannesburg: a gap in health policy in South Africa? J Public Health Policy. 2011; 32 (Suppl 1):S152-61.
59. Deering KN, Vickerman P, Moses S, Ramesh BM, Blanchard JF, Boily MC. The impact of out-migrants and out-migration on the HIV/AIDS epidemic: a case study from south-west India. AIDS.2008;22(Suppl 5):S 165-81.
60. Creswell, JW., Plano Clark, VL. Designing and conducting mixed methods research. Sage Publishers; Thousand Oaks:2007.
61. Trickett EJ, Beehler S, Deutsch C, Green LW, Hawe P, McLeroy K, et al. Advancing the science of community-level interventions. Am J Public Health. 2011; 10(8):1410-9.
62. Lagarde E, Schim van der Loeff M, Enel C, Holmgren B, Dray-Spira R, Pison G, et al. Mobility and the spread of human immunodeficiency virus into rural areas of West Africa. Int J Epidemiology. 2003; 32(5): 744-52.
63. Kis AD. ABC for AIDS prevention in Guinea: migrant gold mining communities address their

risks. AIDS Care. 2010; 22(4):520–5.

64. Magis-Rodriguez C, Lemp G, Hernandez MT, Sanchez MA, Estrada F, Bravo-Garcia E. Going North: Mexican migrants and their vulnerability to HIV. J Acquir Immune Defic Syndr. 2009; 51(Suppl 1):S21–5.
65. Kissinger P, Kovacs S, Anderson-Smits C, Schmidt N, Salinas O, Hembling J, et al. Patterns and predictors of HIV/STI risk among Latino migrant men in a new receiving community. AIDS Behav. 2012; 16(1):199-213.
66. Saggurti N, Schensul SL, Verma RK. Migration, mobility and sexual risk behavior in Mumbai, India: mobile men with non-residential wife show increased risk. AIDS Behav. 2009; 13(5):921–7.
67. Walsh F. Traumatic loss and major disasters: strengthening family and community resilience. Fam Process. 2007; 46(2):207–27.
68. Freudenberg N. Community capacity for environmental health promotion: determinants and implications for practice. Health Educ Behav. 2004; 31(4):472–90.
69. Navaza B, Guionnet A, Navarro M, Estevez L, Perez-Molina JA, Lopez-Velez R. Reluctance to do blood testing limits HIV diagnosis and appropriate health care of sub-Saharan African migrants living in Spain. AIDS Behav. 2012; 16(1):30–5.
70. Anglewicz P. Migration, marital change, and HIV infection in Malawi. Demography. 2012; 49(1):239–65.
71. Zoufaly A, An der Heiden M, Marcus U, Hoffmann C, Stellbrink H, Voss L, et al. Late presentation for HIV diagnosis and care in Germany. HIV Med. 2012; 13(3):172–81.

Role of Public Expenditure on Indian Education System

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ABSTRACT

Modus operandi the study focuses on the emerging trends and changing pattern of public expenditures on education in the post-independence era. The share of investment on education is less than a percent of GDP. Chapter one provides basic idea about the mutual dependence between human resources, government expenditure and education. Chapter two briefs about the evolution of Indian education system in the post-independence period. Chapter three lists the review of literature. The fourth chapter enumerates the methodology of studies including problem statement, objectives and other methods use to analyze the role of public expenditure on education. Chapter six elucidate the literacy rate and its impacts, trend analysis of public expenditure on education and the last chapter concludes with findings and suggestions.

Keywords : *Education, Public expenditure, literacy rate and Children.*

INTRODUCTION

Education is a critical input for human capital. Education not only provides the earning capacity and capability to the society but also stands for the moral values and ethics to lead a proper life with different qualitative benefits. It is intended to accrue knowledge to understand changes in the society and other scientific progresses and thus facilitates brainchild in the form of new invention and innovations. Investment in learing and teaching are the main sources of social wealth. In economic context, generating educational opportunities in a nation accelerates the development process through employment opportunities. Expanding the education leads to higher economic growth as it increase the real national income of a country. It is obvious that the input of educated person to economic growth is more that of an illiterate person. Educational influences rapid growth in the economy in all sectors which in turn improves the socio economic values of the society. It is to be note that mere education alone, will not lead to economic promotion, development or growth. India has enormous power in two areas namely, intellectual property and level of labour forces. The twin forces along with public expenditure on education may pave way for the espousal of new science and technologies and advocacy of increased productivity of the labour force. It also influences the evolution of politico economic institution and formulation new education system which augment the gap of academics and industrial requirement. The need of the study arises as the World Bank estimates indicated that nearly 125 millions of children at school age are out of schooling during the period of 1995, out of which India's share nearly 30 million in the same period. was Fortunately the growing countries have started expanding enrollments in the primary schooling through their public expenditure. Because of deliberate efforts, there are significant ranges of school aged children are now admitted in primary education institution.

Education in India

Right from the independence, Education department has the priority in developing the Indian education system. Pandit Jawaharlal Nehru, the first Prime Minister of India has announced that the education system should be revamped to achieve a secular democracy in the nation. While comparing with 14 developing economies of Asian Pacific [3], India position in 8th rank in Basic education, 7th rank in implementation of education programme, 6th rank in Equality in gender and 5th rank in overall performance in education in 2005. Since British colonial era, India blessed with well-designed higher education system, which was continued smoothly after independence. But the higher education focus of India emphasized with classlessness in education i.e.,

egalitarianism. This has given rise to new heights to wide and fascinated higher education systems and leads to 3rd largest manpower in both scientific and technical at global context. However, India find difficult with the global education race, due to delay in the liberlisation policy. India was the first Asian country started Export Processing Zone in 1965, but liberlisation policy was implemented only in 1990's. The delay of more than two decades, compared to other developing countries, results in nearly 30 percent of its population are illustrated in 1980's. During 1948, Indian government framed a University Commission with the headship of S.Radhakrishnan for purpose of improving the higher education in India. In 1952, one more commission called Secondary Education commission was also framed under the chairmanship of A.L.Mudaliar to receive suggestion from the academicians and public to authenticate the secondary education supplement to conduct of University Education. The Indian education system has emphasized on higher secondary level of education through positive linkage with primary education system. More public funds are allotted for these two systems, which in turn led to swift, unforeseen and uncontrolled expansion in the indian education system. During these periods only IIT and IIM s started. Nevertheless, in the absence required public infrastructure leads to underemployments and unemployment and some extent to emigrate to other nations i.e., indigenous brain drain. It is unfortunate, the persistence of mass illiteracy is big problem of Indian education system. UNESCO, 2003 estimates that the school aged children between 6 to 11 years are out of school in India are nearly 30 million which is one third share of total school aged children of out of school in the world. The majority of non-schooling children are from the states, Andhra Pradesh, Bihar, Madhya Pradesh, Rajasthan, Uttar Pradesh and West Bengal. These six states accounts for 75 percent of total non-schooling of indian non non-schooling children . The are many factors which influences the pattern of public expenditure on education such as low level of literacy, lesser educational attainment, disparity in the enrollment with respect to gender, incomplete and unplanned curriculum demand of child labour and labour market participation salient characteristic of Indian economy.

REVIEW OF LITERATURE

Francis and Iyare (2006)[4] had analyzed the association of education on development with respect to Caribbean nations Jamaica, Barbados, Tobago and Trinidad. The causal relationship between education and development is analyzed for the period of 34 years from 1964 to 1998.This time series data focuses on the data on public expenditure on education per head were obtained from earlier works and data on Gross National Income per capita taken from the World Bank Development Indicators and Online Database. The tools used in this study are applied intergration, VEC models (Vector Correction Models) to analyze the causal relationship between education and development. It reveals that in both the short run and long run, the per capita gross national income is driving education in all the three countries and education causes per capita gross national income in Jamaica in the short run. Thus it reveals bi-directional causality in the short run in Jamaica. There no evidence of causation running from per capita expenditure on education to per capita gross national income in either the short run or long run in Barbados, and Trinidad and Tobago. This study implies that the countries with higher per capita gross national income seem to be spending more per capita on education.

Pulapre Balakrishnan (2007)[5] points out that in India there is an option of finding a diverse set of arrangements in the provision of education. The reason for that was public education in India is not an uplifting spectacle. The unchanged fee structure in the university education, even as there is inflation in the system is destructive of the future of education as it undermines the resource base. A substantial hike in the fees is necessary and the higher subsidy for university education implies lower subsidy for school-going poor at the given total expenditure on education. It reveals that the improved governance is important when more resources allocated to progress the effective of education system in India. Mere investment on education will not bring required changes in the quality of education. It demands proper delivery of academic inputs and egular monitoring. There is a need for an audit agency for education, a statutory body of largely independent persons including educationists one selected globally to review in the form of annual audit, the functioning of the Indian educational system. The recognition should tilt the focus, the path of radically improving the existing public institutions and construction of new independent bodies regulate the deemed institutions and it is the duty of the respective state to maintain the same.

The Kothari Commission

In order to correct the unbalanced growth at various levels of education, the Government of India has formed a Commission under the chairmanship of D.C. Kothari to articulate a comprehensible policy of national education. After reviewing the post-independence progress in education, the commission clinched in 1966, that the tenacity of education was to build self-confidence and transform the Indian state to modern ceremonial. To attain modern ceremonial state with self-confidence, it has recommended the government provided compulsory education to all children in the nation at free of cost in their respective regional languages with the priority to Science, Technology, Research and Development. Perspective of this commission, end up with the flaw as the political environment in India during that period not favourable and the government failed to implement the recommendation and unable to mobilize the resources.

Statement of the Problem

Low levels of literacy, particularly among men and women and backward social groups, high rates of never enrolment and drop-out, high levels of non-attendance of children, poor levels of learning achievement and myriad other shortcomings are seemingly acceptable phenomena in the educational scenario of Indian society[6]. The purpose of education is to acquire few skills and self-confidence right from the childhood. On one side, the Wagner's view on government expenditure is that as the economy grows, the public expenditure also increases proportionately. On the other side, J.M. Keynes's view differs as the government expenditure increases the national income. The current study through light on two hypothesis, as the variables involved are public expenditure and education.

OBJECTIVES OF THE STUDY

To examine the progress of public expenditure on education and total expenditure made in education during 1990-91 to 2006-07.

Literacy in India

India had 1027 million populations out of which 350 million were illiterates. Over the decades, literacy rates have shown a substantial improvement which has been clearly shown in Table 1.1. It is inferred that over the five decades literacy rate has been steadily increased from 18.33 percent in 1951 to 72.27 percent in 2011.

Table 1: Literacy Rates in India (1951 to 2001)

S. No.	Census Year	Literacy Level (in % of Population)
1.	1951	18.33
2.	1961	28.30
3.	1971	34.45
4.	1981	43.57
5.	1991	52.21
6.	2001	64.8
7.	2011	72.27

Source: Census of India

Gender Disparities in Access to Education

During 2000, a new agreement was made at United Nations Millennium Summit. The objective of this agreement was to eliminate gender disparity in primary and secondary education on or before 2005 and it should be extended to all levels by 2015. The recent studies and current discussion confirming that there is a disparity in education favourble to masculine gender and it has proved through access to education and training, completion of education processes, birthrate of genders and completion rates of students

Table: 2 Gender Gap in Literacy in India (1951 to 2001)

Period	Literacy Rate - Male	Literacy Rate - female	Gender difference (Gap)
1951	27.16	8.86	18.30
1961	40.40	15.34	25.04
1971	45.95	21.95	24.00
1981	56.37	29.75	26.62
1991	64.13	39.27	24.84
2001	75.3	53.7	21.6

Source: Census of India

In 2001, the net female enrolment rate of primary education is at 75.7 per cent, lagged behind the male enrolment of 88.5 per cent in India. The literacy rate for women is 53.7 per cent compared with 75.3 per cent of men. There are wide gender variations in the literacy rates. The southern states of Kerala, with a literacy rate of about 90.9 per cent, ranked first in India in terms of both male and female literacy. Bihar a northern state, ranked first in India in terms of both male and female literacy. Bihar a northern state, ranked lowest with a literacy rate of only 47 per cent, 59.7 per cent for males and 33.1 per cent for females.

Table : 3: Share of Public Expenditure in Indian Education system

Year	Investment on Education	Index No.	Annual Growth Rate
1990-91	17193.66	100	-
1991-92	18757.61	109.09	9.09
1992-93	20952.97	121.86	11.70
1993-94	23413.1	136.17	11.74
1994-95	27232.15	158.38	16.31
1995-96	31516.59	183.30	15.73
1996-97	36371.64	211.15	15.40
1997-98	41109.32	239.09	13.03
1998-99	51225.26	297.93	24.61
1999-2000	61281.46	356.42	19.63
2000-01	62498.09	363.49	1.98
2001-02	64847.7	377.16	3.76
2002-03	68561.55	398.76	5.73
2003-04	73044.93	424.84	6.54
2004-05	81280.85	472.74	11.28
2005-06	97224.19	565.47	19.62
2006-07	111888.6	650.75	15.08

Source: Educational Statistics in India.

The share of public expenditure on education in India, during the period from 1990-91 to 2006-07 has increased sizably. The value of public expenditure on education has increased from Rs.17, 193.66 in 1990-91 to Rs.111888.6 in 2006-07. The index number has increased from 100 in 1990-91 to 650.75 in 2006-07 with fluctuations. The linear growth rate is 34.42 per cent. The lowest annual growth rate was 3.76 in 2001-02 and the highest annual growth rate was 19.63 in 1999-2000.

Trend Analysis of Public Expenditure on Education

The outcome of the trend analysis imply that the share of public expenditure on education in India increased annually by 3737.80 during the period 1990-91 to 2006-07[7]**.** The regression co-efficient of the semi-log linear model implies that the public expenditure on education increased at a comprehensive rate of 14.33 percent per year.[1]

The results of the trend analysis imply that the public expenditure on elementary level education of India increased annually by 2001.08 during the period 1990-91 to 2006-07. The regression co-efficient of the semi-log linear model implies that the public expenditure on

elementary level education increased at a comprehensive rate of 12.75 per cent per year.

Suggestions

According to the government records, 52.8 per cent of the children who enter standard I drop put before they reach standard VIII, with children from prodigious preponderance of drop outs. Government of India should take necessary steps immediately to increase public expenditure on education to improve the education system and encourage the women entrepreneurship to eradicate the gender bias to reach new heights in economic growth in India.

CONCLUSION

The study has drawn some interesting observation from the nature of growth analysis of public expenditure on education in India. She is the second largest nation for the school aged children. There is no acceleration or deceleration in growth of public expenditure on education and total government expenditure. However, GDP has experienced acceleration in growth at the rate of 2.70 per cent per annum during 1990-91 to 2005-06.[2] It is expected that the Government of India should allot at least 6 percent of GDP on higher education, but it spends less than one percent of GDP.

Ethical Clearance: completed. (Dept. level committee at VELS)

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REFERENCES

1. Anuradha De, Tanuka E (2008) Public Expenditure on Education in India: Recent Trends and Outcomes. Research Consortium on Educational Outcomes and Poverty.
2. Jandhyala BGT (2006) On Allocating 6 Percent of GDP to Education. EPW.
3. A School Report of 14 Developing Countries in Asia Pacific, The Asian Bureau of Adult Education and Global Campaign for Education, 2005.
4. Brian Francis and Sunday Iyare, "Education and Development in the Caribbean: a Cointegration and causality Approach", Economics Bulletin, Vol.15, No.2, 2006,
5. Pulapre Balakrishnan, "Higher Education in India: Will Six Per cent do It?" Economic and Political Weekly, 2007, pp.3930-3934.
6. Bidani B. and M. Ravallion, 1997. Decomposing Social Indicators Using Distributional Data. Journal of Econometrics, 77.
7. Filmer, D, J. Hammer, L. Pritchett 1998, Health Policy in Poor Countries: Weak Links in the Chain? World Bank Policy Research Working Paper No. 1874, Washington D.C. and their previous issues.

Study of Hypertension in Elderly Patients of Both Sexes in Western Rajasthan Population

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ABSTRACT

45 elderly male and 45 elderly female patient aged between 60-75 years suffering with Hypertension were studied their associated diseases were Diabetes Millitus 7(15.5%) in males 9(20%) in females. Obesity 4(8.8%) in males 5(11.1%) in females CVD 5(11.1%) in males 4(8.8%) in females stroke 7(15.5%) in males 5(11.1%) in female. Renal insufficiency was 5(11.1%) in males and 4(8.8%) in females. CCF was 3(6.6%) in males 4(8.8%) in females physical inactiveness 4(8.8%) males 5(11.1%) in females Alcoholic 5(11.1%) in males 2(4.4%) in females Tobacco chewers. 3(6.6%) in males 4(8.8%) in females Dementia 2(4.4%) in males 3(6.6%) in females patients. The recorded BP in elderly patients of both sexes were classified as Grade I (mild) SBP – 140 – 159 DBP (90-99 Hgmm) were 14(31.1%) males 12(26.6%) in females patients Grade II moderate SBP (mm Hg) (160-179) DBP (Hgmm) (100-109) 10(22.2%) were males, 11(24.4%) were female patients. Grade III (severe) SBP (mmHg) >80 and DBP(MMHG) > 100. 21(46.6%) were males and 22(48.8%) were females. Isolated systolic BP SBP - 140 DBP <90 17 (37.1) in males 18 (40%) female Patients. Causes of secondary HTN in females were Cushing syndrome 9(2%) in males 12(26.6%) in females coarctation of aorta 2(4.4%) in males, 1(2.2%) in females Reno vascular stenosis 5(11.1%) in males 3(6.6%) in females, Endocrine disorders 4(8.8%) in males 9(20%) in females obstructive sleep apnea 10(22.2%) in males, 8(17.5%) in females, Drugs 7(15.5%) in males and females chronic kidney diseases 5(11.1%), in Males, 3(6.6%) in females Pheochromocytoma 3(6.6%) in males, 2(4.4%) in females. This study of HTN in elderly patients with different clinical manifestation will certainly help the physician to treat such patients efficiently as HTN is an important risk factor for CVS morbidity and mortality.

Keywords- *HTN – Hypertension ; SBP - Systolic Blood pressure, DBP = Diastolic Blood pressure. ; ISH = Isolated systolic Hypertension CVD = cardiovascular disease.*

INTRODUCTION

Based on the average reading 140 mm Hg systolic or greater and/ or 90mm Hg diastolic or greater or receiving anti hypertension medications for those above sixty years In clouding elderly male and females are hypertensive patients(1) Hypertension in geriatric population is typically characterized by high systolic BP (SBP) in the setting of normal or even decreased diastolic BP Both elevated SBP and elevated pulse pressure are related to an age related increase in the arterial stiffness. No single factor accounts for this age related increase in SBP Although many factors like arterial stiffness, hypertrophy and loss of contractility of vascular smooth muscle cells, fibrosis, collagen deposition, fragmentation of elastic lamina, calcification. Decreased barorecepter sensitivity increased sympathetic nervous system activity. Increased Alfa- adrenergic receptor was responsiveness. Endothelial dysfunction, decreased nitric oxide production, Sodium sensitivity, decreased ability to excrete sodium load. Low plasma rennin activity. Insulin resistance, central adiposity are the factor to increase the blood pressure in geriatric population(2) It is

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observed that, majority of old patients in whom isolated systolic Hypertension develops have not had an elevated diastolic pressure before[3] Hypertension in the elderly patient represents a management dilemma to cardio vascular specialist and other practitioners. Furthermore wide adaptations of drug strategies targeting subgroups of Hypertensive patients with specific risk conditions to lower blood pressure (BP) beyond traditional goals, difficult questions arise about how aggressive elderly patients should be treated. Is HTN in the elderly an emergency state or not ?. Does BP control lower the risk associated with cardio vascular and death of geriatric Population ?. Hence attempt was made to rule out the various diseases associated with HTN in elderly patients of both sexes. So that physician can treat the cause of HTN along with regulating the elevated BP which can reduce the morbidity and mortality of elderly patients suffering with HTN.

MATERIAL AND METHOD

45 elderly males and 45 elderly females aged between 60-75 years due to illiteracy approximate age was noted. The elderly patients who were regularly visiting to medicine department of Bangar Govt. Hospital Pali – 306401, (Rajasthan) had a complaint of Hypertension were selected for study. These patients were middle socio - economic status. These patients were examined with their cause of HTN and associated diseases. Biochemical and pathological test were also carried out to confirm their diseases. Moreover, ECG was also done to rollout CVD. The individual patients of both sexes were studied, noted and treated accordingly. The duration of this study was about four years.

OBSERVATION AND RESULTS

Table -1. Study of causes of HTN in both elderly sexes of western Rajasthan – DM 7(15.5) in males 9(20%) in females. Obesity was 4(8.8%) in males 5(11.1%) in females CVD 5(11.1%) in males 4(8.8) in females. Stroke was 7(15.5%) in males 5(11.1%) in females Renal insufficiency 5(11.1%) in males 4(8.8%) in females. CCF 3(6.6%) in males, 4(8.8%) in females. Physically inactive was 4(8.8%) in males 5(11.1%) in females Alcoholic 5(11.1%) in males 2(4.4%) in females. Tobacco – chewers 3(6.6%) in males 4(8.8%) Dementia 2(4.4%) in males 3(6.6%) in females

Table – 2. Classification of record of BP in both sexes of western Rajasthan population – Grade – I (Mild) SBP (mmHg) 140-159 DBP (Hg mm) 90-99.14(31%) in males, 12 26.6% in females. Grade II (Moderate) SBP(mmhg). 160-179, DBP(mmhg) 100-10-, (22.21 in males, 11(24.4%) in females. Grade III SBP (mm Hg) > 80 DBP (mm Hg) > 100 21(46.6%) in males 22(48.8%) in females isolated systolic BP SBP > 140 DBP<90 in females 17(37.7%) in males, 18(40%) in females

Table – 3 Study of patients with secondary HTN in both elderly sexes of western Rajasthan Cushing syndrome 9(20%) in males 12(26.6%) in females. Coarctation of aorta 2(4.4%) in males 1(2.2%) in females Reno vascular stenosis 5(11.1%) 3(6.6%) in females Endocrine disorders, 4(8.8) in males 9(20.%) in females obstructive sleep apnea 10(22.2%) in males 8(17.5%) in females. Drugs (NSAID), Alcohol 7(15.5%) in males and females. Chronic kidney disease was 5(11.1%) in males 3(6.6%) in females. Pheochromocytoma was 3(6.6%) in males 2(4.4%) in females

Table – 1: Study of causes of HTN in both sexes of western Rajasthan (Males : 45 ; Females : 45)

Sl no	Particular causes	No of male patient	Percentage	No of Female patient	Percentage
1	D.M	7	15.5	9	20
2	Obesity	4	8.8	5	11.1
3	CVD	5	11.1	4	8.8
4	Stroke	7	15.5	5	11.1
5	Renal insufficiently	5	11.1	4	8.8
6	CCF	3	6.6	4	8.8
7	Physical inactive	4	8.8	5	11.1
8	Alcoholic	5	11.1	2	4.4
9	Tobacco chewers	3	6.6	4	8.8
10	Dementia	2	4.4	3	6.6

Table – 2: Classification of record of Blood pressure in both sexes of western Rajasthan

(Males : 45 ; Females : 45)

Sl no	Particulars	No of male patient	Percentage	Female	Percentage
1	Grade – I (mild/SBP (mmHg)- DBP (mmHg) 140-159 -90-99`	7	15.5	8	17.7
2	Grade II (moderate SBP (MMHG)- DBP(mmHg) 160-179 100-109	9	20	9	20
3	Grade – III (severe) SBP (mmHg)- DBP (mmHg) 7180 >100	12	26.6	10	22.2
4	Isolated systolic HTN SBP > 140. DBP<90	17	37.7	18	40

Table – 3: Causes of secondary hypertension in elderly patients of both sexes of western Rajasthan

(Males : 45 ; Females : 45)

Sl no	Particular causes	No of male patient	Percentage	No of Female Patients	Percentage
1	Cushing syndrome	9	20	12	26.6
2	Coarctation of Aorta	2	4.4	1	2.2
3	Reno Vascular stenosis	5	11.1	3	6.6
4	Endocrine disorders	4	8.8	9	20
5	Obstructive sleep apnea	4	22.2	8	17.5
6	Drugs (NSAID, Alcohol)	7	15.5	7	15.5
7	Chronic kidney diseases	5	11.1	3	6.6
8	Pheochromocytoma	3	6.6	2	4.4

DISCUSSION

In the present study of HTN in elderly patients of both sexes in western Rajasthan population The patients of HTN associated with several diseases like DM 7(15.5%) in males 9(20%) in females. Obesity was 4(8.8%) in females, CVD 5(11.1%) in males 4(8.8%) in females. Stroke was 7(15.5%) in males, 5(11.1%) in females Renal insufficiency 5(11.1%) in males 4(8.8%) in females CCF 3(6.6%) in males 4(8.8%) in females. Physical inactive was 4(8.8%) in males 5(11.1%) in females Alcoholic 5(11.1%) in males 2(4.4%) in females Tobacco chewers 3(6.6%) in males 4(8.8%) in females Dementia 2(4.4%) in males 3(6.6%) in females (table 1). These findings were more or less in agreement with previous studies. [4][5][6]. The BP was recorded and classified into four groups Grade – I (mild) SBP (mmHg) (140-159) DBP (mmHg) 90-99 7(15.5%) males 8(17.7%) females. Grade II (moderate) (SBP (mmHg)) 160-179 DBP (mmHg) 100-109) 9(20%) in males and females. Grade-III (severe) was SBP (mmHg) > 180, DBP (mmHg) > 100. 2 (26.6%) observed in males, 10(22.2%) in females. Grade IV isolated systolic SBP (mmHg) > 140 DBP (mmHg) <90 17(37.7%) in males 18(40%) in females (table No 2). Cause of secondary HTN is the elderly patients were Cushing syndrome 9(20%) in males 12(26.6%) in females. coarctation of aorta 2(4.4%) in males 1(2.2%) in females. Reno vascular stenosis 5(11.1%) in males, 3(6.6%) in females endocrine disorders 4(8.8%) in males, 9(20%) in female. Obstructive sleep apnea were 10(22.2%) in males, 8(17.5%) in females. Drugs (NSAID Alcohol) 7(15.5%) in males and 7(15.5%) in females were observed equally. Chronic kidney disease was 5(11.1%) in males, 3(6.6%) in females. Pheochromocytoma 3(6.6%) in males 2(4.4%) in females these findings were more are less in agreement with previous studies. [7][8]

It was also observed that major reduction in DBP (<65 mmHg) might be associated with ischemic Cardiopathy. Lowering DBP might jeopardize appropriate blood flow in the brain, heart and kidney during the diastole. However, low DBP was not responsible for an increase in the mortality[9] Essential HTN is the most common cause of HTN but Secondary HTN in more prevalent in elderly patients than younger subjects. Reno vascular HTN is common in older people and should be treated with multi drug therapy because renal in sufficiency is of unknown cause [10] moreover ISH in the elderly patients was more difficult to control because of large artery stiffness and major changes in the arterial wall aortic calcification Hence the traditional drugs of anti HTN largely produce vasodilatation rather than decrease arterial stiffness[11] hence increased risk of CVD in elderly secondary to increased arterial stiffness an epiphenomenon related to an underlying chronic debilating illness and or cardiac dysfunction and anti HTN therapy induced lowering of DBP which leads to myocardial ischemia and increased risk for on acute coronary events. High grade stenosis of coronary arteries, increased risk of Myocardial infarction with anti HTN therapy – induced decreased in BP may well occur. Furthermore, one cannot make any distinction between those cardio vascular events that are naturally occurring vs those that are treatment induced indeed frail elderly person (admitted) may have DBP < 60 mm Hg and SBP< 120mmHg in association with reduced survival and often without abnormal left ventricular function or anti hypertensive drug therapy

Apart from anti hypertensive therapy life style modifications including weight loss, physical exercise, low salt diet, should be recommended for patients with hypertensive

SUMMARY AND CONCLUSION

the study of hypertension in elderly patients of both sexes is quite useful to the physician and cardiologist because isolated systolic HTN is a peculiar BP in elderly patients, the approach to HTN in geriatric population should be no different than that of other geriatric syndromes HTN in older people represents a heterogeneous process and should be approached on an individual, case – by case basis, but this study needs further patho-physiological, Histo-pathological, genetic study because remedy and prevention of thickness of blood vessels, exact mechanism of systolic and diastolic movements of heart is still un clear

This research work is approved by ethical committee of Govt. Bangar Hospital Pali- 306401. (Rajasthan)

No **Conflict of Interest**

No **Funding**.

REFERENCES

1- Vasan HS, Beiser A, Sheshadri – S- Residual life time risk for developing Hypertension in middle aged men and women. The Framingham heart study. JAMA. 2002, 287, 1003-10

2- Halter J, Ouslander J. Tinettim Hazards Geriatric medicine and Gerontology. 6th edition 2009, New York MC Grow publication

3- Franklins s pio JR. wong ND. Lesson MG predictors of new- onset diastolic and systolic hypertension the Framingham heart study curriculum 2005, 111, 1121-1127

4 – Wright JT, Fin LJ. Lackland DT – Evidence supporting a systolic blood pressure goal of less than 150 mmHg in patients aged 60 years or older the minority view Ann Intern med 2014, 160, 499, 503.

5- Raghupathy Anchala Nanda.K.Kannuri Hira Panth. Hasan Khan. – Hypertension in India. A systemic review and Meta – analysis of prevalence awareness, and control of Hypertgension, www.jhypertension.com viewed on 1-2-2018

6- pen minx BW. Ferrucci.L Leveille SG – lower extremity performance in nondisabled older persons as a predictor of subsequent hospitalization. J. Geriontol. A Biolsce med. SC 2000, 55, 691-697.

7- Wilnberg N Hoeghlam A, Christensen HR – 24 hrs ambulatory blood pressure in 352 narmal Danish subjects, related to age and gender. Am J. Hypertension 2010, 23, 941-948.

8- Angeli F Reboldi G, Verdecchia P masked hypertension evaluation prognosis, and treatment, Am J. Hypertension 2010, 23, 941-948.

9- Hennet NE – Hypertension in Elderly lancet 1994, 344, 447, 449.

10- Prisant LM, Moser M – Hypertension in elderly, can we improve results of therapy Arch. Intern med. 2000 160, 283-289

11- Mc Eniery CM, MC Donnell BJ – Aortic classification is associated with aortic stiffness and isolated systolic Hypertension Hypertension 2009, 53, 524-531.

Practices regarding Biomedical Waste Management among Health Care Workers of Tertiary Care Hospitals of Meerut, U.P.

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ABSTRACT

Background: The term "biomedical waste" has been defined as "any waste which is generated during diagnosis, treatment or immunization of human beings or animals, or in the research activities pertaining to or in the production or testing of biologicals and includes categories as mentioned in schedule I of the Government of India's Biomedical Waste (Management and Handling) Rules 1998".

Objectives: To assess the practices related to Bio-Medical Waste Management

Material & Method: The present cross sectional study was conducted from march 2016 to February 2017among healthcare workers of tertiary care hospitals of Meerut city. Simple random sampling was used. The written consent was taken. Data was analysed using SPSS version 19 and Pearson's Chi square test was applied.

Results: The healthcare workers segregate BMW according to different categories and they were doing this at the point of generation (87.6% and 88.5% respectively). 88.5% HCWs did not dispose all kind of waste into garbage waste. Majority (89.2%) were following color coding for disposal of BMW. Correct practice related to disposal of Normal Waste was observed in 89.2% of HCWs. Most of the HCWs were correctly disposing category 1,6,7 and 8 of BMW (97.1%, 89.2%, 88.5% and 97.1% respectively) whereas Category 2,3,4,9 and 10 were disposed correctly by nearly three-forth of the HCWs (72.3%, 73.9%, 72.3%, 78.0% and 78.0% respectively).

Conclusion: Practices regarding Bio-Medical Waste was also found to be satisfactory in all the Health Care Workers but lower for IV class workers.

Keywords: *Biomedical waste management, hospital, healthcare workers.*

INTRODUCTION

Nature has made everything for a defined purpose. 'Anything which is not intended for further use is termed as waste'. In the scientific and industrial era, turnover of the products is very high. With increasing need of Health Care in fast changing society, the role of hospitals/nursing homes comes to the forefront. Hospital is a residential establishment which provides short term and long term medical care consisting of observational, diagnostic, therapeutic and rehabilitative services for a person suffering or suspected to be suffering from disease or injury and for parturient.[1]

The term "biomedical waste" has been defined as "any waste which is generated during diagnosis, treatment or immunization of human beings or animals, or in the research activities pertaining to or in the production or testing of biologicals and includes categories as mentioned in schedule I of the Government of India's Biomedical Waste (Management and Handling) Rules 1998".[2]

The inadequate and inappropriate practice of handling of healthcare waste may have serious health consequences and a significant impact on the health of health care personnel, to waste workers, patients, to

general public and environment as well .[3]

MATERIAL & METHOD

The present cross sectional study was done among healthcare workers with the objective to assess their practice regarding biomedical waste management. The study was conducted from March 2016 to February 2017. Ethical approval for the study was taken from institutional ethical committee of Subharti Medical College, SVSU, Meerut. Simple random sampling was used for selection of hospitals. Out of the two tertiary care hospitals in the city one was selected randomly and from the list of 150 bedded hospital in the city one was selected randomly. After that list of all the health care workers (nursing staff, OT technician, lab technician and fourth class) were procured from respective hospitals. Two visits were made in both the hospitals. Health care workers who were present on these two visits and give consent were included in the study. Each category of Health Care Worker were attended separately and two visits for each category was made for collection of data. Prior permission was taken from the concerned authority and arrangement was made to gather the workers at pre-decided date, time and place. Those who were left due to duty etc were attended on second visit. The purpose and objectives of the study was explained to the Health Care Workers prior to data collection and they were assured about the confidentiality of the responder. Data was collected on predesigned pretested semi structured questionnaire which included details of socio-demographic variables like age, sex, education, designation and other details about knowledge of Health Care Workers regarding Biomedical Waste Management. Before filling the questionnaire, each question was explained to the Health Care Workers so that they could understand the questionnaire completely and could answer properly. Single observer demonstrated the questionnaire to all workers. Completion of questionnaire was assured at the time of collection. Data was coded, entered and analysed using SPSS version 19 and suitable test was applied.

FINDINGS

Table No.-1 DISTRIBUTION OF STUDY POPULATION ACCORDING TO THEIR PRACTICE RELATED TO SEGREGATION OF BIOMEDICAL WASTE

	Freq	%
Segregate BMW According To Different Categories		
YES	275	87.6
NO	39	12.4
Segregation Of BMW At The Point Of Generation		
YES	278	88.5
NO	36	11.5
Total	314	100

According to this table majority of the healthcare workers segregate BMW according to different categories and they were doing this at the point of generation (87.6% and 88.5% respectively).

Table No.-2 DISTRIBUTION OF STUDY POPULATION ACCORDING TO THEIR PRACTICE RELATED TO DISPOSAL OF WASTE

	Freq	%
Do You Dispose All Kinds Of Waste Into Garbage Waste		
YES	36	11.5
NO	278	88.5
Do You Follow Color Coding For Disposal Of Normal Waste From The Hospital		
YES	280	89.2
NO	34	10.9
Following Color Coding For BMW Disposal		
YES	280	89.2
NO	34	10.8
Total	314	100

This table shows that 88.5% HCWs did not dispose all kind of waste into garbage waste. Majority (89.2%) were following color coding for disposal of BMW. Correct practice related to disposal of Normal Waste was observed in 89.2% of HCWs.

Table No,-3 DISTRIBUTION OF STUDY POPULATION ACCORDING TO THEIR PRACTICE RELATED TO DISPOSAL OF BMW ACCORDING TO COLOR CODE

	Freq	%
CATEGORY 1		
CORRECT	305	97.1
INCORRECT	9	2.9
CATEGORY 2		
CORRECT	227	72.3
INCORRECT	87	27.7
CATEGORY 3		
CORRECT	232	73.9
INCORRECT	82	26.1
CATEGORY 4		
CORRECT	227	72.3
INCORRECT	87	27.7
CATEGORY 5		
CORRECT	261	83.1
INCORRECT	53	16.9
CATEGORY 6		
CORRECT	280	89.2
INCORRECT	34	10.8
CATEGORY 7		
CORRECT	278	88.5
INCORRECT	36	11.6
CATEGORY 8		
CORRECT	305	97.1
INCORRECT	9	2.9
CATEGORY 9		
CORRECT	245	78
INCORRECT	69	22
CATEGORY 10		
CORRECT	245	78
INCORRECT	69	22
Total	314	100

According to this table most of the HCWs were correctly disposing category 1,6,7 and 8 of BMW (97.1, 89.2, 88.5 and 97.1% respectively) whereas Category 2,3,4,9 and 10 were disposed correctly by nearly three-forth of the HCWs (72.3%, 73.9%, 72.3%, 78.0% and 78.0% respectively).

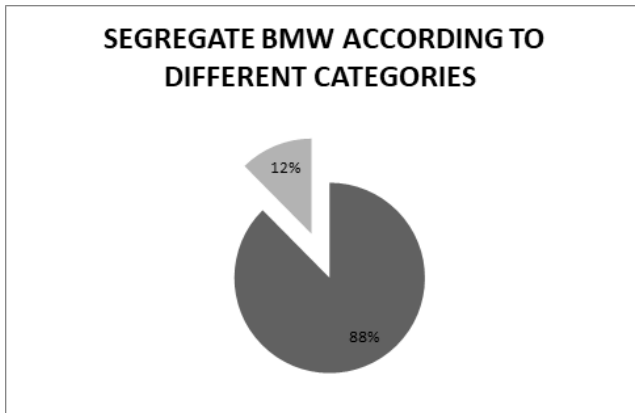

FIGURE 1. DISTRIBUTION OF HCWs ACCORDING TO THEIR PRACTICE RELATED TO SEGREGATION OF BMW ACCORDING TO DIFFERENT CATEGORIES

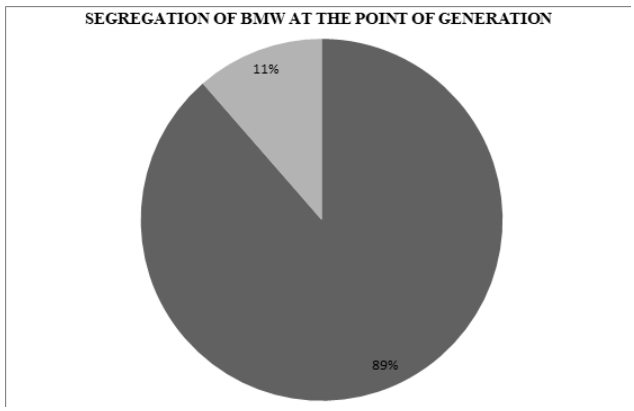

FIGURE 1a. DISTRIBUTION OF HCWs ACCORDING TO THEIR PRACTICE RELATED TO SEGREGATION OF BMW ACCORDING TO DIFFERENT CATEGORIES

FIGURE 2. DISTRIBUTION OF HCWs ACCORDING TO THEIR PRACTICE RELATED TO DISPOSAL OF WASTE

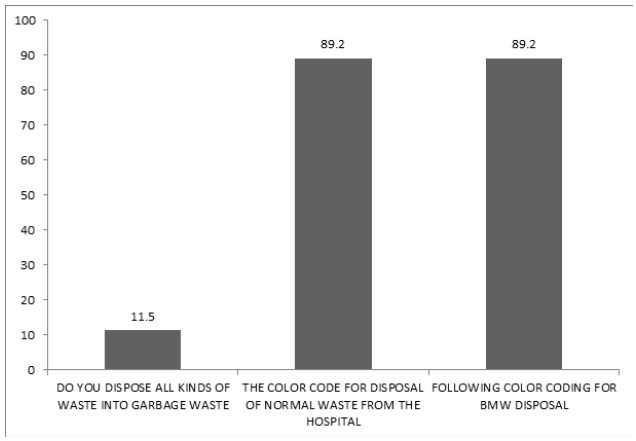

FIGURE 3. DISTRIBUTION OF HCWs ACCORDING TO THEIR PRACTICE RELATED TO DISPOSAL OF BMW ACCORDING TO COLOR CODE

DISCUSSION

In our study the practice of segregation of BMW according to different categories was 97.3% in Nursing Staff and 96.2% in Lab Technician, while it was 100.0% in OT Technician and 28.9% of IV class workers whereas Sehgal et al (2015)[4] reported in their study that the practice of segregation of BMW according to different categories was 100.0% in Nursing Staff, Lab Technician and IV class workers. Sanjeev R et al (2014)[5] reported in their study that the practice of segregation of BMW according to different categories was 68.6% in HCWs.

In the present study 88.5% HCWs said No for the practice of disposal of all kinds of waste into general garbage among HCWs whereas Sanjeev R et al (2014)[5] reported in their study that the practice of disposal of all kinds of waste into general garbage among HCWs said No was 81.8%.

In the present study almost all the Nursing Staff (99.1%) and most of the Non Nursing Staff (92.1%) had correct practice of category 1. The difference was found to be statistically significant. Majority of the Nursing Staff (89.8, 88.9, 85.3 and 84.9% respectively) had correct practice related to category 5,6,9 and 10 whereas nearly two-third of the Non Nursing Staff (66.3, 65.2, 59.6 and 60.7% respectively) correctly dispose BMW according to color code. The difference was found to be statistically significant. Three-fourth of the Nursing Staff (77.3%) and nearly two-third of Non Nursing Staff (59.6, 65.2, 59.6 and 65.2%) had correctly dispose category 2, 3,4and 8. The difference was found to be statistically significant. Incorrect practice related to category 2,3,4,5,8,9 and 10 was found to be more among class IV HCW (73.4, 62.2, 73.4, 64.4, 62.2 and 73.3% respectively).

CONCLUSION

The present cross-sectional study was conducted among health care workers of tertiary care hospitals of Meerut city with the objectives to assess practice regarding Biomedical waste Management. Practices regarding Bio-Medical Waste was found to be satisfactory in all the Health Care Workers except for IV class workers.

Conflict of Interest: There is no conflict of Interest in my study.

Source of Funding: Self

Ethical Clearance: Ethical clearance was taken from the ethical committee of Subharti Medical College.

REFERENCES

1. Biomedical waste management cell directorate of health services, Biomedical waste status in National Capital tertiary of Delhi, government of NCT of Delhi; 2006.
2. Sharma A , Sharma V , Sharma S , Singh P. Awareness Of BMW Management Among Health Care Personal In Jaipur , India. Journal of Oral Health and Dental Management 2013; 12 (1): 32-40
3. Dudi M , Sharma R , Jain M. Knowledge Regarding BMW Management Among Rhos (Resident House Officers) In A Tertiary Care Centre . Journal Of Research In Medical And Dental Sciences 2015;3 (3):185-187.
4. Sehgal R.K et al. Study of Knowledge, attitude and practice regarding Bio-Medical Waste among health care workers in a Multi-speciality teaching hospital at Delhi. International Journal of Medical Science and Public Health 2015;4 (11):1540-1544.
5. Sanjeev R et al. Knowledge, attitude and practices about biomedical waste management among dental healthcare personnel in dental colleges in Kothamangalam: a cross-sectional study. Health sciences 2014; 1 (3): 1-12.

Study of Determinants of Renewal of Health Insurance Policies

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ABSTRACT

Introduction- Health insurance in India is still at a naïve stage. Out of pocket (OOP) expenditure is still the most predominant mechanism for funding healthcare.Studies have shown that there exists a close relationship between the health conditions of the people and the economic growth of the country in which they live. In such scenario, there is a dire need to study determinants of renewal of health insurance policy.

Method – A descriptive study was carried out to understand factors affecting renewal of health Insurance policy in Pune City.Questionnaire was circulated to 200 individuals who were covred under voluntary health insurance. Further, this population was studied for two variables a) those who have renewed their health insurance policy at least once and b) who did not renew the policy and discontinued after one year. Further determinants of renewal were compared within both the groups.In addition, respondents were identifiedfrom both the groups who have availed benefit of health insurance policy through cashless hospitalisation or reimbursement. The claim settlement process was studied through 5-point Likert scale.

Results- Age, income, percentage spending on healthcare as well as total expenses affects the renewal decisions. Younger individuals have shown to be more customary in paying the premium and renewing the policy &willing to renew health insurance policy. The group who have renewed health insurance have also rated tax savings component higher

Conclusion -The study suggests need of product innovation to suit everyone's needs. The products offered should focus upon long term benefits and tax savings components to sustain customers for a longer duration. The results also suggest improving the claim settlement process as customer satisfaction is significant factor in influencing the renewal decision of policyholder.

Keywords *– Health insurance, Renewal, claim settlement*

INTRODUCTION

Even after the liberalisation of insurance sector in 1986 penetration of health insurance in India is still at a naive stage. Approximately 12 percent of the population is covered under some form of insurance. With the central and state government, aiming towards universal health coverage and through the launch of schemes like Ayushman Bharat, insurance sector is certainly progressing towards better days.

The public health spending in India is equal to 1% of GDP, the out of pocket (OOP) being the pre dominant mechanism for financing healthcare in the country. The penetration of health insurance is remarkably low as compared to that in other developing economies in the world.[1]

The World Bank in a 2012 report says that the healthcare expenditure was one of the major cause of poverty in India.[2] Nearly 65 % of the India's poor get into debt and 3% fall below poverty line each year because healthcare related expenses. In such scenario, Health insurance is the only viable option to make healthcare

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available and accessible.[1]

One of the most ambitious goals was to achieve universal healthcare by 2020. This goal was aiming at covering maximum population under health insurance and significantly reducing out of pocket expenditure.[2,3]It is observed that nearly 40% of hospitalised patients sell assets or borrow money to afford treatment and an average of 24% fall further down the poverty trap in this process. One of the reasons for lack of a proper health-seeking behaviour within the poor community is the expensive medical treatment especially at private hospitals and the poor facilities available at public health centres.[3,4]

Studies have shown that there exists a close relationship between the health conditions of the people and the economic growth of the country in which they live.[5]As government continues to take efforts in this step, the insurance companies which are the major players in the market should aim at increasing demands of health insurance.[5,6]

Health insurance is the need of the hour and the consumers are willing to purchase insurance if the they pursue product is beneficial.[7-9]Several studies have listed the most prevalent variables: gender, marital status, Religion/ethnicity, education, income level, age, geographical mobility, and family size. The studies pertaining to demand and supply of health insurance in India are scarce as compared to the developed countries so are the studies pertaining to renewal of health insurance. It is considered that factors which affect the purchase decision will also influence the renewal of health insurance policy.[8]

Health insurance policies like any other product is affected by consumers purchase decision. Repeat buying of the same product in health insurance is considered as renewal. The classical five stage consumer decision process model introduced by Philip Kotler which gave a generalized view of the purchase decision, still remains valid as a basic approach to consumer purchase decision process and may be applied to health insurance purchase.

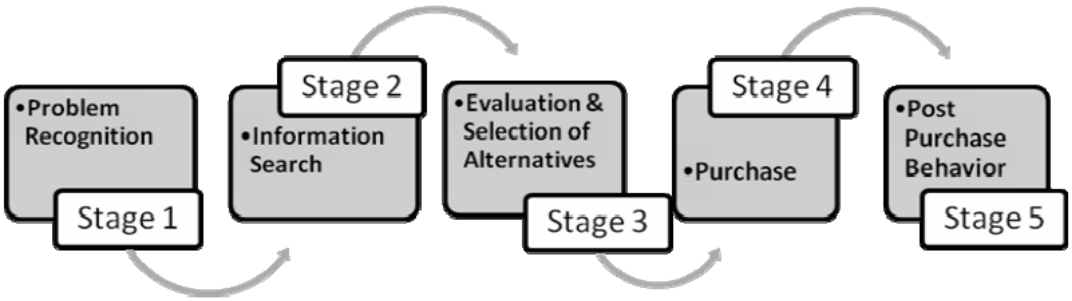

Fig. 1 The Five Stage Buying Decision Proces

(Image source- Principles of Marketing, 14th edition, Philip Kotler)

Consumer choice is one of the essential preconditions for regulated competition in health care. Health insurance in higher income educated group adopts five stage decision process.Thus it is considered that the determinants of purchase and renewal of health insurance are common.[10]

Studies carried out in various parts of India as well as globally have shown that the major contributing factors to the health insurance are the age,gender, income marital status and occupation. On the supply side of health insurance, the determinants are important, as it is the basis for improvement in their processes like ease of reimbursement and other administrative processes.[11]

Health insurance is voluntary and the consumer may take it if found beneficial .This is the main challenges of the companies to attract to something without which also one can survive. Health insurance policy are annual and typically renewed after one year. It is only recently some private

General insurance companies have started selling two-year health insurance plans. Healthinsurance providers are generally reluctant to offer long-term health insurance policies.[12-14]

However, some amount of customers get attracted towards the policy considering the tax saving component the penetration is still very low. On the other hand, there

are many challenges for an insurance company to have long-term products. One reason is the impulsiveness of medical costs in future. Healthcare delivery is affected by changing technology, evolving equipment's and procedures. Apart from this healthcare cost is also affected by governmental rules and fiscal policies. On the other hand, least efforts are taken to understand the demography, epidemiology and prevalence of medical conditions in population so that the appropriate pricing of the policy can be derived. In such scenario, there is a need to study determinants of health insurance policy renewal. [15]

Aim- The study aims to bring out determinants of renewal of health Insurance policy

Objectives of the Study

To study the factors influencing renewal of health insurance policies in Pune City.

To assess customer satisfaction among those who have availed the benefits of health insurance.

METHODOLOGY

A descriptive study was carried out to understand factors affecting renewal of health Insurance policy. Data was collected through a questionnaire from individuals enrolled in voluntary health insurance policies in Pune City. The questionnaire was circulated to 200 individuals out of which 130 responded and filled the complete questionnaire. Questionnaire included data on different socio-economic variables like age, income, gender, education & occupation. Other important parameters on which information was gathered included healthcare expenditure and hospitalisation & claims if any during the insured period.

The inclusion criteria were limited to individuals enrolled in voluntary health insurance at least once in three years. Further, this population was studied for two variables a) those who have renewed their health insurance policy at least once and b) who did not renew the policy and discontinued after one year. Further determinants of renewal were compared within both the groups.

In addition, respondents were identifiedfrom both the groups who have availed benefit of health insurance policy through cashless hospitalisation or reimbursement. The claim settlement process was studied through 5-point Likert scale. The parameters studied included claim settlement process, transparency, hospital care, documentation and accurate communication and overall experience with payer and provider.

Data Analysis and Results

The total sample size included in the study was 130.Out of 130 respondents 59 had renewed their health insurance policy whereas 71 did not renew it. This clearly indicates that non-renewal of health insurance is more.

Table 1- Descriptive statistics of policyholders renewing and not renewing health insurance

Parameter	N=59 Renewed health insurance policy	Mean	N=71 Did not renew health insurance policy	Mean
Total monthly income More than 1 lakh 40,000 to 1,00,000 Up to 40,000	58 N=22 N=18 N=38	57510	71 N=17 N=34 N=27	45226
Annual healthcare expenditure	59	49092	71	40982
Age	59	40.23	71	42.31
Percentage spending on health annually	59	18.22	71	15.23

Cont.... **Table 1- Descriptive statistics of policyholders renewing and not renewing health insurance**

Average Premium paid	59	11,452	71	11,300
	Number of policies renewed	Claim filed	Number of policies did not renewed	Claim filed
Claim filed due to hospitalization	59	N=22	71	N=23

Table1 shows the distinct characteristics of both the groups. It is evident that those respondents who have renewed health insurance policy have higher income as compared to those who haven't renewed. This suggest that higher income enables one to pay the premium on a regular basis and be more sustainable towards health insurance. The similar observations were seen with total monthly expenditure and percentage spending on health, which was higher in the group who have renewed health insurance. The mean age of the respondents was found to be lower in the group who have renewed health insurance. This suggests that younger respondents have shown more continuity and regularity. Younger individuals in the renewed group also said that the tax saving components is also an important deciding factor in insurance purchase and renewal.

Also, renewal of health insurance was found to be significantly affected by Healthcare expenses. The percentage spending on health was more than the non renewed group.

Experience with claim settlement process

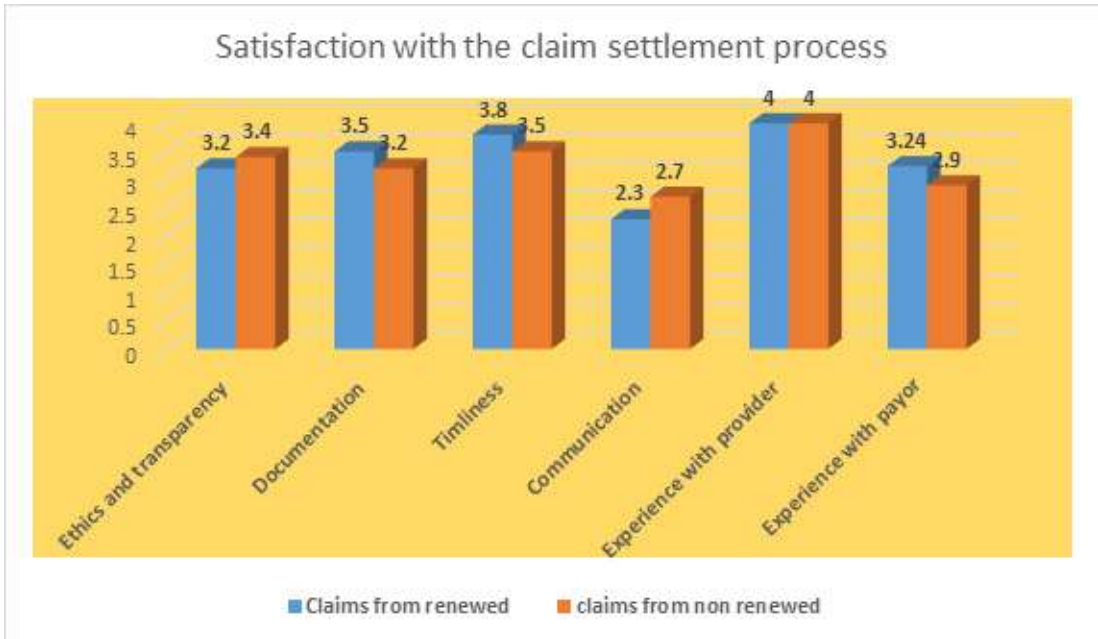

Fig 2 –Satisfaction levels with respect to health insurance policy

Total 71 respondents did not renew their health insurance policy after one year.23 of them faced were hospitalised and could avail the benefit of the policy. Number of claims filed from the group who have renewed Health insurance were 22.and from the non-renewed were 23.The experience related to claim settlement process was also studied in both the groups.

The results have been summarised in Fig 2.

From the Total 130 respondents 59 respondents renewed their health insurance policy. Out of these 59 respondents 22 were hospitalised and could availed the benefit of the policy. Those hospitalised were further enquired about the claim settlement process and associated factors. The questions included information on ethics and transparency, documentation, timeliness of process, communication, experience with payer and providers.

DISCUSSION

The study aims to identify factors affecting continued enrolment in health insurance policy through renewal of the policy in Pune City. The variables included in the study attempted to examine the determinants of renewal of health insurance policy. In the study younger age, higher income and high healthcare expenditure were found to be significant determinants of continuation of the policy. The experience about the quality of care, experience of payer and provider also affects renewal. The findings can be correlated to the marketing studies, where the researchers have found that if the customer is satisfied there is higher probability of repeat purchase of the product. We also found that if the customer's satisfaction level from insurer is high and his experience from insurer was good then probability of renewing the policy was high.

These experiences positively influence renewal of health insurance policy.

Age, income, percentage spending on healthcare as well as total expenses also affect the renewal decisions. Younger individuals have shown to be more customary in paying the premium and renewing the policy. And are ready to renew health insurance policy. The group who have renewed health insurance have also rated tax savings component higher. This means that this is also one of the attracting factors in continuing the policy. This attracts for product innovations with better tax saving components along with coverage and premiums. Out of the total 71 respondents of non renewed group, 23 had availed the benefit of hospitalisation but this even this benefit could not result into continuation of the policy for the next year. This suggests that mere hospitalisation expenses are not enough to retain the policy holders.

In both the groups, there was no significant difference in the average amount of premium paid. However the income varied in both the groups. This suggests that for better continuity of the policies products needs to be designed to suit every ones economic status.

From both the groups majority of respondents who have files claims have rated claim settlement process as average. The process is considered a cumbersome one with loads of documentation. The suggests that process needs to be more transparent and customer friendly.

CONCLUSION

Health insurance policies are not long-term policies and they are required to be renewed each

year. Understanding the factors that affect the demand and renewal decisions of continuing in health insurance programme is vital for future growth and developmentof this sector. The important determinants in terms of renewal of health insurance policies observed in the study were younger age , higher income and higher medical expenses.

The study also aims at product innovation with long- term benefits and tax savings components to sustain customers for a longer duration. Insurance companies need to develop and market the product and choose target customers in a policyholder in the manner to ensure long-term continuity. The results also suggest improving the claim settlement process as customer satisfaction is significant factor in influencing the renewal decision of policyholder. This should encourage insurance companies to provide a good experience to the customer during the period of the policy.

Source of Funding- Nil

Conflict of Interest- None

Ethical Clearance – IEC of Symbiosis International (Deemed University)

REFERENCES

1. World Bank. 2012. The World Bank Annual Report 2012: Volume 1. Main Report. World Bank Annual Report;. Washington, DC...
2. Ahuja, R. (2005). "Health Insurance for Poor: An Analytical Study." Indian Council for Research onInternational Economic Relations Working Paper no. 161.

3. Bhat, Ramesh and Nishant Jain (2006). "Factors affecting the demand for health insurance in a microinsurance scheme." Working Paper 2006-07-02, IIM Ahmedabad
4. Bhat, Ramesh and Nishant Jain (2006). "Analysis of public and private healthcare expenditures."Economic and Political Weekly Vol 41 No 1 January 7, 2006.
5. Cameron, A. C., P. K. Trivedi, et al. (1988). "A Microeconomic Model of the Demand for Health Care and Health Insurance in Australia." Review of Economic Studies 55(181): 85.
6. Devadasan, N., K. Ranson, et al. (2004). "Community Insurance in India : An overview." Economicand Political Weekly July.
7. Ellis, R. P., MoneerAlam and Indrani Gupta (2000). "Health Insurance in India: Prognosis and Prospectus." Economic and Political Weekly XXXV(4).
8. Gumber, A. and V. Kulkarni (2000). "Health Insurance for Workers in the Informal Sector, Detailed Results from a Pilot Study." National Council of Applied Economic Research New Delhi.
9. Hurd, M. D. and K. McGarry (1997). "Medical insurance and the use of health care services by the elderly." Journal of Health Economics 16(2): 129-154.
10. Kronick, R. and T. Gilmer (1999). "Explaining the decline in health insurance coverage, 1979-1995."Health Affairs 18(2): 3
11. MavalankarDileep and Bhat Ramesh (2001). "Health Insurance in India : Opportunities, Challenges and Concerns. Indian Insurance Industry: Transition and Prospects by Srivastava D C and Srivastava S (eds.)" New Century Publications, New Delhi.
12. Rao, S. (2004). "Health insurance: Concepts, issues and challenges." Economic and Political Weekly
13. .Savage, E. and D. Wright (1999). "Health Insurance and Health Care Utilization: Theory and Evidence from Australia 1989-90." Mimeograph. Sydney, University of Sydney.
14. .Thompson, A. M., & Rao, C. P. (1990). The need for consumer behavior analysis in health care coverage decisions. Health Marketing Quarterly, 7(1/2), 97-114.\
15. Kundu S, 2009 Health Insurance – An Alternative Healthcare Financing Mechanism in Rural India, Indian Journal of Human Development, Vol. 3, No. 2, 2009.
16. Lavanya V A, 2012, Estimating urban households willingness to pay for health insurance in Coimbatore, International Journal of marketing , Financial services & management research.Vol 2 no. 2 , February 2012,ISSN 2277 3622.

Phytochemical Analysis and Antifungal Activity of *Ganoderma lucidum*

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ABSTRACT

Ganoderma lucidum has been used for several decades for both treatment strategy and health promotion. The manifestation of new infections, drug resistant, high costs of synthetic drugs and their side effects has led to an increase in the use of traditional medicine globally. Hence an endeavor has been made in this study to examine the antifungal activity of both ethanol and methanol extracts of *G. lucidum*. The phytochemical screening was done to reveal the bioactive constituents of *G. lucidum*. The phytochemical screening of *G. lucidum* revealed that the extracts contain bioactive compounds such as carbohydrates, glycosides, triterpenoids and phenolic compounds. The both extracts of *G. lucidum* were then subjected for the Minimum Inhibitory Concentration (MIC) determination with the help of micro-dilution bioassay. Various pathogenic organisms were selected against which the antifungal activity of the extracts were determined. The result of the antifungal activity showed that the methanolic extract of *G. lucidum* showed the strongest antifungal activity among the two extracts against the fungal strains.

Keywords: *Ganoderma lucidum, Antifungal activity, Minimum Inhibitory Concentration.*

INTRODUCTION

Nature has been a source of medicinal agents for thousands of years and an impressive number of modern drugs have been isolated from natural sources; many of these isolations were based on the uses of the agents in traditional medicine[1]. The herbal medicines serve the health needs of about 80% of the world s population, especially for millions of people in the vast rural areas of developing countries; more than 65% of the global population uses medicinal plants as a primary health care modality[2].

Plants have been a major focus of investigations for novel biologically active compounds[3]. However, filamentous fungi have been the producers of some of the most powerful secondary metabolites which have been developed into therapeutic agents[4]. In view of this, the searches for new anti-microbial agents from medicinal plants are even more urgent in the countries like India where infectious diseases of fungal origin are not only widespread, but the causative agents are also developing an increasing resistance against many of the commonly used antibiotics[5].

There is a constant search for new antibiotics because the existing drugs have unwanted toxicity and their inappropriate and indiscriminate use have led to an increase in antibiotic-resistant strains[6]. Numerous investigations have proved that medicinal plants as well as microorganisms contain diverse classes of bioactive compounds such as Tannins, Alkaloids, Flavonoids, Terpenoids, Phenols, etc[7]. The main aim of this current study was to detect the various bioactive components present in *G. lucidum* and also determine the antifungal

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activity to prove its use as a safe and potent antifungal agent.

MATERIALS AND METHOD

Preparation of extracts

The fruiting bodies of *G. lucidum* were obtained from MKV Organics, Puducherry. The extraction method of with certain modifications was used[8]. The dried fruiting bodies were grinded to a fine powder using a domestic blender. For preparing the extracts, methanol and ethanol were used as solvents to obtain the pharmacologically active compounds from the mushroom[9-11].

For every 1 gram of powder, 50 ml of solvent was used and was subjected to extraction using a Soxhlet extraction apparatus. After the completion of extraction, the supernatant was filtered through Whatman #1 filter paper. All solvent extracted fractions were evaporated to dryness to obtain residues. The extracts were stored at 4˚C in air tight containers for further investigations[12].

Phytochemical screening

The different qualitative chemical tests can be performed for establishing a profile of given extract for its chemical composition. The extracts were then subjected to qualitative chemical tests for various phytoconstituents like Alkaloids, Flavonoids, Carbohydrates, Reducing sugars, Tannins and Phenolic compounds, Cardiac glycosides, Terpenoids, Anthraquinones, Saponins, Volatile oils and Steroids[13-15].

Detection of alkaloids

a) Mayer's Test

To a few ml of extract, one drop of Mayer's reagents was added by the side of the test tube. A white creamy precipitate indicated the test as positive.

Preparation of Mayer's Reagent

Mercuric chloride (1.358g) was dissolved in 60 ml of water and KI (5.0 g) was dissolved in 10 ml of water. The two solutions were mixed and made up to 100 ml with water.

b) Wagner's Test

To a few ml of extract, few drops of Wagner s reagent were added by the side of the test tube. A reddish brown precipitate confirmed the test as positive.

Preparation of Wagner's Reagent

Iodine (1.27 g) and KI (2 g) were dissolved in 5 ml of water and made up to 100 ml with distilled water.

Detection of Carbohydrates

a) Molisch's test

To 2 ml of extract, two drops of alcoholic solution of α-naphthol was added, the mixture was shaken well and 1 ml of conc. H_2SO_4 was added slowly along the sides of the test tube and allowed to stand. A violet ring indicated the presence of carbohydrates.

b) Benedict's Test

To 0.5 ml of extract, 1 ml of Benedict s reagent was added. The mixture was heated on a boiling water bath for 2 mins. A characteristic coloured precipitate indicated the presence of sugar.

Benedict's Reagent

Sodium citrate (173g) and Na_2CO_3 (100g) were dissolved in 800 ml of distilled water and boiled to make it clear. CuSO4 (17.3g) dissolved in 100 ml distilled water was added to it.

Test for Glycosides

a) Legal's test

To the extract, few drops of 10% NaOH were added to make it alkaline. Sodium nitroprusside was added to the solution. Presence of blue colouration indicated the presence of glycosides in the extract.

b) Keller-Killiani test (for cardiac glycosides)

To 2 ml of extract, 2 ml glacial acetic acid is added, followed by one drop of 5% $FeCl_3$. Conc. H_2SO_4 is added from the side of the test tube. Reddish brown ring appears at the junction of the two liquid layers indicating the presence of cardiac glycosides.

Detection of Proteins and Amino Acids

a) Millon's Test

To 2 ml extract, few drops of Millon's reagent were added. A white precipitate indicated the presence of proteins.

b) Biuret Test

An aliquot of 2 ml of extract was heated with 1 drop of 2 % CuSO4 solution. To this 1 ml of ethanol (95%) was added, followed by excess of KOH Pellets. Pink colour in the ethanolic layers indicated the presence of proteins.

Detection of Flavonoids

a) Shinoda test (Magnesium Hydrochloride reduction test)

To the test Solution, few fragments of Magnesium ribbon were added and concentrated Hcl was added drop wise, pink scarlet, crimson red or occasionally green to blue color appears after few minutes.

b) Alkaline reagent test

To the test solution few drops of sodium hydroxide solution was added; formation of an intense yellow color, which turned to Colourless on addition of few drops of dil. acid, indicated the presence of flavonoids.

Detection of Phytosterols

a) Libermann Burchard's Test

To the extract, 3 ml of acetic anhydride was added and mixed. To this one drop of concentrated H_2SO_4 were added slowly along the sides of the test tube. An array of colour change showed the presence of phytosterols.

Test for Triterpenoids and Steroids

a) Libermann Burchard's Test

Extract was treated with few drops of acetic anhydride, boiled and cooled. Conc. H_2SO_4 was added from the sides of the test tube, showed a brown ring at the junction of two layers and the upper layer turning green showed the presence of Steroids and formation of deep red colour indicated the presence of triterpenoids.

b) Salkowski test

Extract was treated with few drops of conc. H_2SO_4, shaken well and allowed to stand for some time; red color at the lower layer indicated the presence of Steroids and formation of yellow colored lower layer indicated the presence of Triterpenoids.

Detection of Phenolic Compounds and Tannins

a) Ferric Chloride Test

To the extract, few drops of neutral 5% ferric chloride solution were added. A dark green colour indicated the presence of phenolic compounds.

b) Lead Acetate Test

To the extract, 3 ml of 10% lead acetate solution was added. A bulky white precipitate indicated the presence of phenolic compounds.

Fungal Test strains used

A total of five fungal species were tested. *Candida albicans* (ATCC-10231), *Aspergillus niger* (ATCC-6275), *Aspergillus flavus* (ATCC-204304), *Aspergillus fumigatus* (ATCC-16907) and *Cryptococcus neoformans* (ATCC-208821).

Culture media and inoculum preparation

The isolates were grown on Sabouraud dextrose agar (Himedia) for 48 h at 35°C. The inoculum preparation followed the directions of document M27-A of the NCCLS[16]. Thus, the optical density (OD) of a 0.5 McFarland standard at 530 nm was measured five times on different days. Therefore, a suspension of each of the yeasts in sterile distilled water was adjusted in Bausch & Lomb spectrophotometer to that OD_{530} range.

Minimum Inhibitory Concentration (MIC)

The MIC was determined as the lowest concentration of the extract which inhibited the growth of the tested fungi. A broth micro-dilution bioassay in 96-well micro titer polystyrene plates was used to determine MIC. The method of was followed with modifications[17]. The wells of each column (1-12) were filled with 50 µl of sterilized RPMI broth (except the first well of each column). 100 µl of the extracts (methanol and ethanol) having a concentration of 10 µg/ml was added to the first well of columns 4-12. Serial two fold dilutions were made of the 10 µg/ml extract with the broth in the 07 consecutive wells of the columns. The concentration of the extracts ranged from 10 to 0.0625 µg/ml. Next, 50 µl of the fungal inoculam were added to each well so that the final volume of each well was 150 µl. The first & second column of the plate served as the positive and negative control. The plates were covered and then incubated at 37°C for 24h. After 24-48 hrs, 40 µl of 0.2 mg/ml iodonitrotetrazolium chloride was added to each well and the plates were further incubated at 37°C for 30 min. Fungal growth in the wells was indicated by development

of red-pink color, while growth inhibition was indicated by no change in the colour of cell suspensions. The MIC of each extract is defined as the lowest concentration inhibiting the growth of the fungi and was recorded.

RESULTS AND DISCUSSION

Qualitative phytochemical screening

The phytochemical screening of *G. lucidum* revealed that the extracts contain Carbohydrates, Glycosides, Triterpenoids and Phenolic compounds. Methanol and ethanol extracts were found to extract the maximum active components being solvents that have low polarity. This result was in accordance to the previously reported literature[18]and is represented in Table-1.

Table.1 Qualitative phytochemical analysis of *Ganoderma lucidum* from two organic solvents

S. No	Phytochemical	Test	Observation	
			Methanol	Ethanol
1	Alkaloids	Mayer's test	-	-
		Wagner's test	-	-
2	Carbohydrates	Molisch's test	+	+
		Benedict's test	+	-
3	Glycosides	Legal's test	+	+
		Keller-Killiani test	+	+
4	Proteins and Amino acids	Millon's test	-	-
		Biuret test	-	-
5	Flavonoids	Shinoda test (Magnesium Hydrochloride reduction test)	-	-
		Alkaline reagent test	+	-
6	Phytosterols	Libermann - Burchard's test	-	-
7	Phenolic Compounds and Tannins	Ferric Chloride test	+	+
		Lead Actetate test	+	-
8	Triterpenoids and Steroids	Libermann - Burchard's test	+	+
		Salkowski test	+	+

Determination of Minimum Inhibitory Concentration (MIC)

The MIC values of the extracts against the tested strains are represented in Table-2. The MIC value of the extracts ranged from in descending (10 µg/ml, 05 µg/ml, 2.5 µg/ml, 1.25 µg/ml and 0.625 µg/ml).

The MIC of the methanol extract was found to be 0.625 µg/ml against *Candida albicans*, for ethanol extract was found to be 1.25 µg/ml against *Candida albicans. Candida albicans* and *Aspergillus fumigatus* were found to be the most susceptible fungal strains as the two extracts inhibited their growth.

For *Aspergillus flavus* and *Cryptococcus neoformans* the ethanol extract was found to be the most effective, whereas for *Aspergillus fumigatus*, both extracts were equally found to be effective, for *Aspergillus niger* only the methanol extract was found to be effective. The antifungal activity of the methanolic extract against *Candida albicans* and *Aspergillus fumigatus* is of great importance as they are emerging pathogens[19].

Table. 2 Minimum inhibitory concentration (MIC) (µg/ml) values of the extracts against the tested organisms

Minimum Inhibitory Concentration (µg/ml)		
Organisms (n=360)	**Methanol**	**Ethanol**
Candida albicans (162)	0.625	1.25
Aspergillus flavus (32)	ND	2.5
Aspergillus fumigates (86)	2.5	2.5
Aspergillus niger (56)	1.25	ND
Cryptococcus neoformans (24)	ND	1.25

Antifungal activity

This study justifies the claimed uses of *G. lucidum* in the traditional system of medicine and its bioactive components to treat various infectious diseases caused by the microbes[20].

The presence of antimicrobial substances in the higher plants and filamentous fungi is well established. Hence the antifungal activity of *G. lucidum* is described in this study[21].

Candida albicans, Aspergillus flavus, Aspergillus fumigates, Aspergillus niger and *Cryptococcus neoformans* were found to be inhibited by the both extracts of *G. lucidum.* The presence of important phytoconstituents like Carbohydrates, Glycosides, Triterpenoids, Phenolic compounds and tannins could be responsible for the antifungal properties[22]. However, thorough research needs to be done in order to recognize the phytoconstituents responsible for the antifungal activity before being used for the development of any drugs.

CONCLUSION

The results obtained from this work showed that extracts of *G. lucidum* medicinal mushroom screened exhibit antifungal effects present more in methanolic extract than ethanol extracts against the fungal strains. This study also supports the traditional usage of the studied plants and suggests that *G. lucidum* extracts possess compounds with antifungal properties that can be used as antifungal agents in new drugs for the therapy of infectious diseases caused by pathogens.

Conflict of Interest: No.

Source of Funding: Self.

Ethical Clearance: Obtained.

REFERENCES

1. Abraham, J., and Thomas, TD. Antibacterial activity of medicinal plant *Cycleapeltata* (Lam) Hooks &Thoms. Asian Pacific Journal of Tropical Disease. 2012, S280-S284.
2. Kamaraj, C., Rahuman, A., Siva, C., Iyappan, M., and Kirthi, AV. Evaluation of antibacterial activity of selected medicinal plant extracts from south India against human pathogens. Asian Pacific Journal of Tropical Disease. 2012, 2(1), S296-S301.
3. Sheena N, Ajith TA, Mathew AT, Janardhanan KK. Antibacterial activity of three macrofungi, Ganoderma lucidum, Navesporus floccosa and Phellinus rimosus occurring in South India. Pharmac Biol. 2003, 41(8),564-7.
4. Naveenkumar C, Swathi S, Jayalakshmi G, Chidambaram R, Srikumar R. Screening of Antifungal Activity of *Ganoderma lucidum* Extract Against Medically Important Fungi, Indian Journal of Public Health Research & Development, 2018, 9, 269-272.
5. Kumar NC, Jayalakshmi G, Chidambaram, Srikumar R. *In-vitro* Evaluation of Antifungal Activity of *Ganoderma lucidum* Against the Biofilm Producing *Candida* species. Indian J of Pharmaceutical Education and Research. 2017, 51, S46-S53.
6. Srikumar R, Jeya parthasarathy N, Shankar E M, Manikandan S, Vijayakumar R, Thangaraj R, Vijayananth K, Sheeladevi R, Usha Ananda rao A, Phystotherapy Research, 2007; 21: 476-480.
7. Chitemerere, TA., and Mukanganyama, S. In Vitro Antibacterial Activity of Selected Medicinal Plants from Zimbabwe. The African Journal of Plant Science and Biotechnology. 2011, 5(1), 1-7.
8. Kamra, A., and Bhatt, AB. Evaluation of antimicrobial and antioxidant activity of *Ganoderma lucidum* extracts against human pathogenic bacteria. International Journal of Pharmacy and Pharmaceutical Sciences. 2012, 4(2), 359- 362.
9. Phillips R. Mushrooms and other fungi of Great Britain and Europe. London, United Kingdom:

Macmillan Publishers Ltd 1981.

10. Hall IR, Stephenson SL, Buchanan PK, Yun W, Cole ALJ. Edible and Poisonous Mushrooms of the World. Timber Press Inc., Oregon, USA, 2003, 372p.
11. Oria de Rueda JA. Hongos y setas. Tesoro de nuestros montes. Palencia, Spain: E diciones Cálamo 2007.
12. Quereshi S, Pandey AK, Sandhu SS. Evaluation of antibacterial activity of different Ganoderma lucidum extracts. People Journal of Scientific Research 2010, 3(1), 9-13.
13. Raaman, N. Phytochemical Techniques. In: New India Publishing - Botanical chemistry, New Delhi. Pp. 2006, 19-24.
14. De, S., Dey, YN., and Ghosh, AK. Phytochemical investigation and chromatographic evaluation of the different extracts of tuber of *Amorphaphallus paeoniifolius* (Araceae). International Journal on Pharmaceutical and Biomedical Research (IJPBR). 2010, 1(5), 150-157.
15. Shamaki, BU., Geidam, YA., Abdulrahma, F., Ogbe, AO., and Sandabe, UK. Evaluation of phytochemical constituents and in vitro antibacterial activity of organic solvent fractions of *Ganoderma lucidum* methanolic extract. International Journal of Medicinal Plant Research. 2012, 1(3), 026- 031.
16. National Committee for Clinical Laboratory Standards *Reference method for broth dilution antifungal susceptibility testing of yeasts. Approved standard M27-A.* (National Committee for Clinical Laboratory Standards,Wayne, Pa) (1997).
17. Yakob, HK., Sulaiman, SF., and Uyub, AM. Antioxidant and Antibacterial Activity of *Ludwigia octovalvis* on *Escherichia coli* O157:H7 and Some Pathogenic Bacteria. World Applied Sciences Journal. 2012, 16(1), 22-29.
18. Shamaki, BU., Geidam, YA., Abdulrahma, F., Ogbe, AO., and Sandabe, UK. Evaluation of phytochemical constituents and in vitro antibacterial activity of organic solvent fractions of *Ganoderma lucidum* methanolic extract. International Journal of Medicinal Plant Research. 2012, 1(3), 026- 031.
19. Ameri, A., Vaidya, JG., and Deokule, SS. In vitro evaluation of antistaphylococcal activity of *Ganoderma lucidum, Ganoderma praelongum and Ganoderma resinaceum* from Pune, India. African Journal of Microbiology Research. 2011, 5(3), 328-333.
20. Patterson T F, Revankar S G, Kirkpatrick W R, Dib O, Fothergill A W, Redding S W, Sutton D A, Rinaldi M G, Journal of clinical Microbiology, 1996; 34: 1794-1797.
21. Chuang P, Lee C, Chou J, Murugan M, Shieh B, Chen H, Bioresource Technology, 2007; 98: 232-236.
22. Alderman CJ, Shah S, Foreman JC, Chain B M, Katz DR, The role of advanced oxidation protein products in regulation of dendritic cell function. Free Radic Biol Med, 2002; 32: 377-385.

Pattern of Cutaneous Manifestations among HIV Patients of a Tertiary Care Teaching Hospital

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ABSTRACT

Introduction: The most recent data from UNAIDS, about 35 million people are living with HIV infection worldwide. Cutaneous disorders occur more frequently as HIV infection advances and immune function deteriorates; however, they are common and of various types throughout the course of HIV disease. Taking cutaneous disorders into consideration for case management is essential to improve quality of life for HIV-infected patients. **Materials and method:** The current record based study was conducted at the tertiary care teaching hospital of Kasturba medical College, Mangalore. The records of all the HIV positive patients who visited dermatology clinic, were retrieved from the record section of the hospital. The information pertaining to the demographic characteristics, mode of transmission of HIV and cutaneous manifestations were obtained from the case records.. Data was entered and analyzed using SPSS

Results: About half (n=67, 51.5%) the patients were in the age group of 26-35 years, and one quarter (n=30, 23.1%) were between 36 and 45 years old. About 86.9% (n=113) of patients acquired HIV through the sexual exposure. **Conclusion:** Oropharyngeal candidiasis was the most common dermatological manifestations observed among the participants in the current study

Keywords: *HIV, Mangalore, cutaneous manifestations*

BACKGROUND

HIV infection/ AIDS is a global pandemic, the hallmark of which is a profound immunodeficiency, which results from a progressive quantitative and qualitative deficiency of helper T cells. [1] According to the most recent data from UNAIDS, about 35 million people are living with HIV infection worldwide. [2]. Estimates from NACO (National AIDS control organization) the national adult HIV prevalence in India is approximately 0.36 percent, amounting to between 2 and 3.1 million people. More men are HIV positive than women. Nationally, the prevalence rate for adult females is 0.29 percent, while for males it is 0.43 percent. Prevalence is also high in the age group of 15-49 years (88.7 percent of all infections). [3] Aberrant immune activation and inflammation in HIV infected individuals contribute considerably to the increased incidence of chronic conditions like cancer, neurocognitive dysfunction, diabetes, kidney, liver and cardiovascular disease. [1]

Cutaneous disorders occur more frequently as HIV infection advances and immune function deteriorates; however, they are common and of various types throughout the course of HIV disease. Taking cutaneous disorders into consideration for case management is essential to improve quality of life for HIV-infected patients. [4] Skin disorders are common manifestations of human immunodeficiency virus (HIV) disease: they

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affect between 80% and 95% of HIV-infected patients according to the literature, [5-9] occurring at any time in the course of infection. It is commonly seen that skin is the first and only organ affected during the course of the disease. [10,11]

Cutaneous disorders during HIV infection are numerous and [7,8] can vary from the macular rash seen in acute seroconversion syndrome to end-stage Kaposi Sarcoma. [1] The more common non-neoplastic manifestations are seborrheic dermatitis (seen in up to 50% of patients with HIV), folliculitis (~20% of patients with HIV) and shingles (seen in 10-20% of patients). [1] Some have drawn attention because their onset defines some of the Centers for Disease Control and Prevention (CDC) acquired immunodeficiency syndrome (AIDS) clinical categories, eg, oral candidiasis, zoster, herpes simplex, oral hairy leukoplakia, and Kaposi sarcoma, but most have been documented solely in case reports. In the context of HIV infection, cutaneous disorders can present with particular clinical manifestations: unusual anatomical sites, increased severity, treatment failure, and unusual clinical appearance. These lesions are often the first manifestations of symptomatic HIV disease. Clinicians need to be aware of these diagnoses and the order of their appearance since correct interpretation is essential for counseling patients about the progression of their illness and for initiating appropriate therapy. [5] Hence, this study was undertaken to find out the various cutaneous manifestations among HIV patients and also to list out the other opportunistic infections in HIV patients with cutaneous manifestations.

MATERIALS AND METHOD

Ethical clearance was obtained from the Institutional Ethics Committee (IEC) of Kasturba Medical College, Mangalore (MAHE) before starting the study. The current record based study was conducted at the tertiary care teaching hospital of Kasturba medical College, Mangalore. The records of all the HIV positive patients who visited dermatology clinic, were retrieved from the record section of the hospital after obtaining the permission from the Medical Superintendent. The information pertaining to the demographic characteristics, mode of transmission of HIV and cutaneous manifestations were obtained from the case records. Medical case records were scrutinized for the completeness; and incomplete records were excluded from the study. Data was entered and analyzed using SPSS (Statistical Package for Social Sciences) Version 11.5. Results were expressed by using proportions, mean and standard deviation.

RESULTS

Table 1: Baseline characteristics of study population (n=130)

Baseline characteristics	Number	Percentage
Age group (Years)		
≤ 25	25	19.2
26-35	67	51.5
36-45	30	23.1
>45	08	06.2
Gender		
Male	86	66.2
Female	44	33.8
Marital status		
Single	40	30.8
Married	90	69.2

A total of 130 patients with HIV attended the dermatology clinic during the study period. The demographic features of the patients are given in Table 1. About half (n=67, 51.5%) the patients were in the age group of 26-35 years, and one quarter (n=30, 23.1%) were between 36 and 45 years old. Two-thirds (n= 86, 66.2%) of the patients were male. 30 patients (23.1%) were employed in hotels and 33 (25.4%) of them were housewives.

Table 2: Distribution of study population according to mode of transmission of HIV (n=130)

Mode of transmission	Number	Percentage
Heterosexual	110	84.6
Homosexual	003	02.3
Blood transfusion	002	01.5
Mother to child	001	00.8
Unknown	014	10.8

The distribution of study participants by route of transmission is given in Table 2. About 86.9% (n=113) of patients acquired HIV through the sexual exposure,

among which 110 were through heterosexual exposure while 3 were through homosexual exposure.

Table 3: Cutaneous manifestations of HIV infected patients (n=108)

Cutaneous manifestation	Number	Percentage
Candidiasis	39	36.3
Viral infections	23	21.3
Bacterial infections	09	08.4
Scabies	08	07.5
Pigmentation	07	06.4
Ichthyosis	07	06.4
Dermatophytoses	05	04.6
Pruritus	04	03.7
Seborrheic Dermatitis	03	02.7
Xerosis	03	02.7

Table 3 gives the cutaneous manifestations of HIV. About one-third (n=39, 36.3%) of the patients had candidiasis, while 23 patients (21.3%) had viral infections like herpes zoster and herpes simplex.

DISCUSSION

This was a retrospective study done by studying the case records of 130 HIV infected patients attending the tertiary care hospital. Out of 130 HIV patients with cutaneous manifestations 86 (66.2%) were males and 44 (33.8%) were females. Majority of the patients (n=97, 74.6%) belonged to the age group of 26-45years. The age differences in the occurrence of the disease between the sexes could be attributed to early marriages in females and early detection, either due to pregnancy or because their spouse tested positive. Studies done by Spira et all [4] and Singh et all [12] also show high male prevalence. The National Commission on Macroeconomic and Health India report reveals that in high prevalence area like Karnataka, Andhra Pradesh, Maharashtra and Tamil Nadu males had higher prevalence 12.9 compared to females 4.4. [13] as reflected in our study.

Housewives formed 25% of the study group, hotel workers 23%, drivers 8% and manual laborers 7%. Occupations such as fishermen, farmers, masons etc formed 34% of the study group. The statistics points to a low socioeconomic status, similar to a study done in eastern India in which 80% of study participants belonged to lower socioeconomic strata with income less than Rs.1500 per month. [12] This points to a low level of education and awareness, which is reflected by the increased number of cases seen in this group. Further, it also points to poor nutrition, which in itself can hasten the progression of the disease.

More than four fifth of cases gave history of heterosexual exposure as mode of acquisition of infection while 3 patients gave history of homosexual mode of infection. This is congruent with another study done in India in which majority (94%) of cases were transmitted through heterosexual contacts, however a study done by Powers reported that in only 34% of cases the mode of transmission of infection was by heterosexual route. [14]. Study by Spira reported 35% transmission of infection by homosexual route, which is much higher than our study. [4]

Oropharyngeal candidiasis was the commonest mucocutaneous manifestation accounting for 39 (36.3%) cases followed by viral infections such as herpes zoster, herpes simplex and molluscum contagiosum in 23 (21.3%) patients. Other cutaneous manifestations were scabies ,pigmentation , icthyosis , dermatophytosis and less commonly xerosis and seborrheic dermatitis. The pattern obtained was similar to other studies. [15-17.] However, these findings are very different from another study done in India with a similar sample size (n=137), which found seborrheic dermatitis to be the most common manifestation (74%), while oral candidiasis was seen in only 17.5% of patients. Further, pigmentation and xerosis were more prevalent, 47% and 52.5% respectively, as compared to our study. [12] Pruritus is a common complaint in the HIV-infected patient. [18]. The overall predominance of skin disorders in homosexual and bisexual men compared with the other HIV transmission groups, even after exclusion of Kaposi sarcoma, may be explained by the fact that these patients usually report more easily their discomfort than the others. Moreover, some skin disorders, such as condyloma or molluscum contagiosum, are known to be caused by sexually transmitted agents.

CONCLUSION

As evident from present study HIV mainly affected the working age group of the society predominantly

through sexual route. Oropharyngeal candidiasis was the most common dermatological manifestations observed among the participants in the current study.

Ethical Clearance- Taken from Institutional Ethics committee

Source of Funding- None

Conflict of Interest - Nil

REFERENCES

1. Kasper DL, Braunwald E, Fauci AS, Hauser SL, Longo DL, Jameson JL, Loscalzo J. (2008). Harrison's principles of internal medicine (17th ed.). New York: McGraw-Hill Medical Publishing Division.
2. UNAIDS. AIDSinfo. http://www.unaids.org/en/dataanalysis/datatools/aidsinfo. Accessed 7 July 2015
3. NACO. HIV data. http://naco.gov.in/NACO/Quick_Links/HIV_Data/. Accessed 7 July 2015.
4. Spira R, Mignard M, Doutre MS, Morlat P and Dabis F. Prevalence of Cutaneous Disorders in a Population of HIV-Infected Patients. Arch Dermatol. 1998;134(10):1208-1212.
5. Tschachler E, Bergstresser PR, Sting lG. HIV-related skin diseases. Lancet. 1996;348659- 663
6. Coldiron BM, Bergstresser PR. Prevalence and clinical spectrum of skin disease in patients infected with HIV. Arch Dermatol. 1989;125357-361
7. Pitche P, Tchangaï-Walla K, Napo-Koura G et al. Prevalence of skin disease in AIDS patients in the Lome-Tokoin Teaching Hospital of Togo [in French]. Sante. 1995;5349- 352
8. Coopman SA, Johnson RA, Platt R, Stern RS. Cutaneous disease and drug reactions in HIV infection. N Engl J Med. 1993;3281670- 1674
9. Uthayakumar S, Nandwani R, Drinkwater T, Nayagam AT, Darley CR. The prevalence of skin disease in HIV infection and its relationship to the degree of immunosuppression. Br J Dermatol. 1997;137595- 598.
10. Goldstein B, Berman B, Sukeni kE, Frankel SJ. Correlation of skin disorders with CD4 lymphocyte counts in patients with HIV/AIDS. J Am Acad Dermatol. 1997;36262- 264
11. Smith KJ, Skelton HG, Yeager J et al. Cutaneous findings in HIV1-positive patients: a 42-month prospective study. J Am Acad Dermatol. 1994;31746- 754
12. Singh H, Singh P, Tiwari P, Dey V, Dulhani N, Singh A. Dermatological manifestations in HIV-patients at a tertiary care hospital in a tribal (Bastar) region of Chhattisgarh, India. Indian J Dermatol.2009;54:338–41.
13. Kumar R, Jha P, Arora P, Dhingra N. Byword Editorial Consultants. New Delhi, India: NCMH Background Papers—Burden of Disease in India; 2005. HIV-1 trends, risk factors and growth in India; pp. 58–73.
14. Powers K. The role of acute and early HIV infection in the spread of HIV and implications for transmission prevention strategies in Lilongwe, Malawi: a modelling study. The Lancet July 2011; 378 (9787): 256–268.
15. Concus AP, Helfand RF, Imber MJ, et al. Cutaneous cryptococcosis mimicking molluscum contagiosum in a patient with AIDS. J Infect Dis 1988;158:897-898.
16. Johnson PC, Khardori N, Najjar AF, et al. Progressive disseminated histoplasmosis in patients with acquired immunodeficiency syndrome. Am J Med 1988;85:152-158.
17. Murakawa GJ, Kerschmann R, Berger T. Cutaneous cryptococcus infection and AIDS. Arch Dermatol 1996;132:545-548.
18. Herman K. Richard A. Jacoby, Webster G. Pathology of HIV-related skin disease. Clinics in Dermatology 1991; 9(1): 95–110.

To study the Knowledge and Association between Self Medication and Education among People Residing in Hilly Area

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ABSTRACT

Background: Self-medication can be both beneficial and harmful for Hilly Area people where universal access to health care is yet to be achieved. This area is having various disease drug resistant region and also very much vulnerable to harms of self-medication. *Objectives:* Therefore, this study was initiated to determine the knowledge of self-medication and also found to be association between education and self medication practices in hilly population. *Material and Methods:* The study was a community-based cross-sectional study carried out at Kalgaon PHC of Patan Taluka. A total of 487heads of family were selected by randomization. *Result:*In spite of all these conditions commonly practiced self medication in hilly area for fever, headache, etc. In this study fever and headache as reported by 64.7% and 61.0% followed by Abdominal Pain 54.2%, Cough (55.9%), and Diarrhea 43.9%. Although among population 63.7% respondents had correct knowledge regarding dose, 64.9% about duration, 9.7% about contraindication, 0.6% regarding expiry date. *Conclusion:* Higher percentages of self-medication practices were seen among all the population. This study helps the respondents had better knowledge of dose, duration, indication as compared to its contraindication and its adverse effects.

Keywords: *Self-medication, Knowledge, Health education, Hilly Area, Cross Sectional Study*

INTRODUCTION

Self-care has been characterized as the basic level of health care in all societies from the ancient time. This urge of self-care might have been a driving force motivating for self-medication.

The World Health Organization has been promoting the practice of self-medication due to inadequacy in implementing health care delivery system, particularly in remote and rural areas.

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OTC (over the counter) drugs are intended for self-medication and are of established efficacy and safety, their inappropriate use due to lack of knowledge of their side effects and interactions could have serious insinuation, especially in special population groups like children, elderly, pregnant and lactating mothers [1].

Antimicrobial resistance is a current problem worldwide particularly in developing countries where antibiotics are often available without a prescription[2].

Aim:- To study prevalence of practice of self-medication among people residing in hilly area.

Objectives:-

To study status of knowledge regarding Self Medication among people residing in hilly area.

To study the association between self - medication and education of the study population.

Material and Methods

Background to the study area:-

The present study was carried in remote and hilly areas of Patan Talukain Satara District. Out of 13 P.H.C.s in Patan Taluka,Kalgaon P.H.C. was selected randomly and out of 5 sub centres, Kachni was also selected randomly covering population of 2754 in 551 households.Kachni is 27 km. from KrishnaInstitute of Medical Sciences "Deemed To Be University" , Karad.

Study design:-

The study was conducted as a community-based cross-sectional survey in an attempt to assess the practices towards self-medication among the residents of hilly area of Patan Taluka using a self-administered questionnaire.

Study Population:-

The study population comprised of heads of families residents at sub centre Kachni selected randomly from the five sub centres in jurisdiction of Kalgaon PHC in the patan taluka. The inclusion criterion for the selection of participants was that they had to be permanent residents of the local and were to be above 18 years of age.

Sample size:-

The desired sample size for the study was determined using the formula

Assuming 50% of families (head of families) were using self medication.

i.e. p = 50% (users)

q = 50% (non users)

L= allowable error

Minimum families (head of families) to be studied is

$n = 4pq/L^2$

$n = 4 \times 50 \times 50/5^2$

n = 400

Sampling Technique

Out of 13 PHC in Patan Taluka, Kalgaon PHC was selected randomly and out of 5 sub centre,Kachni also selected randomly by lottery method.With the minimum sample size known, a total of 487 heads of family were selected, randomly and were enumerated and the number of participants from each was selected by sampling fraction.

Survey Instrument

This study instrument was an anonymous, self-administered, questionnaire based-survey, carried out from November 2013 to June 2014. A self developed questionnaire which was tested for validity and reliability and modified accordingly consisting of mainly closed-ended questions was used for data collection. The information on the questionnaires included social demographic variables such as age, gender, income,occupation and level of education. In addition to questions on demographic information, the questionnaire also included questions on knowledge of self-medication, involvement in self-medication practices, frequency of self-medication, sources of drugs used, and reasons for self-prescribing.

Data Analysis:

Following completion of data collection, it was reviewed, organized and entered into a micro computer running the Statistical Package of Social Science (SPSS version.) software for windows Vista and Epidemiological Information Software (Epi Info 3.5.3) to validate and analyze the entries. The results are based upon the data obtained from residents. The prevalence of self-medication was reported as percentages. The survey was descriptive and data was summarized as rates and ratios.

Ethical Considerations:

The study was approved by the Department of Community medicine, and Ethical committee of Krishna Institute of Medical Sciences Deemed University Karad. And a letter of consent was obtained from the medical officer of PHC Kalgaon. Participants were properly informed by the interviewer on the nature of study, its confidentiality, importance to the society and procedures for completing the questionnaire, and informed consent was obtained in all cases. **Funding:**

Project is funded by Krishna Institute of Medical Sciences "Deemed To Be University", Karad.

Limitations:

This study was largely constrained by time which prevented the use of a larger sample size. Another limitation of this study was the reliance on self-reported data about self-medication from the respondents coupled with inability to ascertain drugs used, and their dosages. The inability to establish the occurrence of side effects following drug use could also have limited the study.

Observations and Results:

A total of 487 study subjects were included in the study and the data was collected by structured interview among the heads of family from hilly area.(aged above 18 years).

Socio-demographic characteristics:-

Table 1: Socio-demographic characteristics of the respondents

Sr. No.	Demographic variables		Frequency	%
	Age	Upto 30yrs	22	4.5
		31-40yrs	109	22.4
		41-50yrs	175	35.9
		51-60yrs	147	30.2
		61-70yrs	34	7.0
	Mean age	46.82		
	Std. Deviation	9.640		
	Gender	Male	384	78.9
		Female	103	21.1
	Occupation	Farmer	234	48.0
		Labour	253	52.0
	Education	Illiterate	274	56.3
		Primary – I (1dt to 4th)	83	17.0
		Primary – II (5th to 7th)	81	16.6
		SSC	45	9.2
		HSC	3	.6
		Graduate	1	.2
	Income Group	Rs. 1786-2976 (SEC-III)	3	.6
		Rs. 893-1785 (SEC-IV)	25	5.1
		<= Rs. 893 (SEC-V)	459	94.3
	Family Type	Nuclear	360	73.9
		Joint	127	26.1

Table 2: Association between Self-medication practices and education of the respondents.

Sr. No.	Education	Self-Medication		Total	Pearson Chi-Square	
		Yes	No		Value	P- Value
	Illiterate	212	62	274	47.367	0.000*
	Primary	49	34	83		
	Primary	37	44	81		
	SSC	21	24	45		
	HSC	0	3	3		
	Graduate	0	1	1		

*Significant when p<0.05

RESULT

As depicted in above table literacy status was significantly associated with practice of self medication which was more in illiterates.

Table No. 3 Conditions commonly practiced for self-medication by the respondents

Sr. No.	Common conditions	Self medication	
		Yes	No
	Fever	315(64.7%)	4(.8%)
	Headache	297 (61.0%)	22(4.5%)
	Malaise	181(37.2%)	138(28.3%)
	Abdominal Pain	264(54.2%)	55(11.3%)
	Cough	272(55.9%)	47(9.7%)
	Cold	29(6.0%)	290(59.5%)
	Vomiting	77(15.8%)	242(49.7%)
8.	Diarrhoea	214(43.9%)	105(21.6%)
9.	Weakness	43(8.8%)	276(56.7%)
10.	Other Symptoms	15(3.1%)	304(62.4%)

RESULT

The above table shows that commonest 10 frequently reported conditions for seeking self-medication included fever and headache as reported by 315 (64.7%) and 297(61.0%) followed by Abdominal Pain (264 respondents) (54.2%), Cough(272 respondents) (55.9%), Diarrhoea (214 respondents) (43.9%) respectively.

Table 3: Knowledge about medications among respondents.

Sr. No.	Knowledge	Self medication		Pearson Chi-Square	
		Yes	No	Value	P value
1	Dose	310 (63.7%)	9 (1.8%)	483.066[a]	.000*
2	Duration	316 (64.9%)	3 (.6%)	482.589[a]	.000*
3	Indication	316 (64.9%)	3 (.6%)	482.589[a]	.000*
4	Contra indications	47 (9.7%)	272 (55.9%)	482.669[a]	.000*
5	Expiry Date	3 (0.6%)	316 (64.9%)	484.050[a]	.000*
6	Adverse Effect	19 (3.9%)	300 (61.6%)	480.804[a]	.000*
***Significant when p<0.05**					

This table shows that the knowledge about medications among respondents where 63.7% respondents having correct knowledge regarding dose, 64.9% about duration,9.7%regarding contraindication, 0.6 regarding expiry date,&3.9% regarding Adverse Effect respectively and the maximum population 55.9%, 64.9% and 61.6% still significantly lack appropriate knowledge about contra indication, Expiry Date and Adverse Effect respectively.

DISCUSSION

Majority of the respondents 384 (78.9%) were male and 103 (21.1%) were female (table No1). Meaning that more men were compounded in the research than women, may be due to the nature of jobs men entail in that may not give them the time to relax and participate in other activities. This result matches with the study done by Mohamed saleem T.K 2011[3] where majority male respondents were found compared to females.

This study showed higher prevalence among the age group between 41 to50 years which was similar findings (35.9%) seen in the study conducted by Afolabi (2008) Banerjee; Bhadury& other (2012)[4], Patil S.B & other[5]; Santosh Kumar; Binjawadgi; Kanakhi (2014),Stein & other[4,5,6].

Another study conducted in Mexico[7] revealed that females practiced more self medication (61.9%) than males did (38.1%) and identified women as fundamental element in the consumption of drugs and employment of self medication. Studies conducted in Spain showed that Self-medication is more prevalent among women, persons who live alone, and persons who live in large cities. Inappropriate or unsafe use should be properly addressed and managed[7].

The study done by Nitin kumar, Stein et al. showed prevalence more in the female (82.2%) & (55.5%) respectively which contradicts to our study.

Overall educational status was found less though educated individuals seems to take physicians advice. In the present study majority of the respondents had not attended even primary school education 274 (56.3%) followed by 83 (17.0%) had achieved primary level 1 education, and only 81(16.6%) had attained primary level 2 education and only 45 (9.2%) had secondary school. This shows the high number of primary school drop outs and attendance level as well as a reduce illitereracy and increased drop out level which is stipulated by a reduced. Respondents who attended primary level and a further reduction in secondary school attendance. This study however contradicts a study done by Azeem AK et al. 2011 in USAwhere majority of the respondents had completed was attending secondary education.

Various studies on the relationship between educational status and attitude towards self-medication

commonly found that differences in educational levels may be responsible for the finding that more young and middle-class patients regard medication as not always being essential for every illness and concluded that the difference between social classes is statistically significant[8].

World-wide, consumers commonly reach for self-care products to help them solve their common health problems which include fever, body pains, indigestion, diarrhoea, vomiting, cough, and upper respiratory tract infections[9, 10].

Self medication with drugs is an economical choice of treatment for common self limiting illnesses all over the world.[11]Certain studies[12, 13, 14] amongst different populations reveal that the population had a fairly good knowledge on the advantages of self medication, as they correctly perceived it as time-saving and economical, doing away with the need to go to a doctor for minor illness and providing quick, easy and convenient relief[15, 16]

The relationship between educational status and attitude towards self-medication commonly found that differences in educational levels may be responsible for the finding that more young and middle-class patients regard medication as not always being essential for every illness and concluded that the difference between social classes is statistically significant[73].

The study showed a positive correlation between the education level of the respondents and the tendency to obtain medications from the hospital/pharmacies. The prevalence among the illiterates was 7.5%, 30.6% in those who had primary education, 42.2% in those with secondary and 62.5% in those who had post-secondary school education. In contrast, there was a negative correlation between the education level of the respondents and the tendency to obtain medications from patent medicine stores and local hawkers.

SUMMARY &CONCLUSION

This was a community based cross sectional study conducted in hilly area of Patan Taluka of a sub centre kachni under PHC Kalgaon from Nov. 2013 to Dec.2014 among 487 heads of families as a study subjects.

Among the 487 respondents 319(65.5%) were using self medication. Out of which 41-50 yrs. of age group which was an economically productive age group was practicing more (35.5).

Comparatively all respondents who were practicing self medication were illiterates (77.37%) belonged to nuclear family.

The respondents had better knowledge about dose, duration and Indication as compared to its contraindication and adverse effect. This study intention to continue this practice in the future and recommend to others should be an alarming wake up call to all the doctors, health care providers, pharmacists and policy makers of Government of India.

Conflicts of Interest: Author declared that no conflicts of interest.

REFERENCES

1. Murray MD, Callahan CM. Improving medication use forolder Adults: An integrated research agenda. *Ann Intern Med* 2003; 139:2425-9.
2. Nordeng H, Havnen GC. Impact of socio-demographicfactors, knowledge and attitude on the use of herbal drugs in pregnancy. *ActaObstetGynecolScand* 2005; 84: 26-33
3. Mohamed saleem T.K 2011 Self -medication with over the counter drugs:A questionnaire based study. *Der Pharmacia Lettre* 2011; 3(1): 91-98.
4. Sonam J, Malvi R, Purviya J. Concept of Self Medication: A Review*, International Journal of Pharmaceutical & Biological Archives* 2011; 2(3):831-836
5. Nithin Kumar, TanujKanchanet.al. Perceptions and Practices of Self-Medication among Medical Students in Coastal South India. *PLoS One*2013; 8(8)Published online 2013 Aug 28
6. Bartlomé JA, Bartlomé P, BradhamDD. Self-care and illness response behaviours in a frontier area. *J Rural Health.*1992 Winter;8(1):4-12.
7. Klemenc-Ketis Z, Hladnik Z, Kersnik J. A cross sectionalstudy of sex differences in self-medication practices among university students in Slovenia.*CollAntropol* 2011; 35(2):329-34.
8. Afolabi AO. Factors influencing the pattern of self-medication in an adult Nigerian population. *Annals of African Med* 2008;7(3):120-7

9. ArikpoGE,EjaME,Enyi-IdohKH:SelfMedication in Rural Africa: The Nigeria Experience. *The Internet Journal of Health*2010;11: 1

10. Oshikoya KA, Njokanma OF, Bello JA, Ayorinde EO et al. Family self-medication for children in an urban

area of Nigeria.*Paediatric and Perinatal Drug Therapy* 2007; 8 (3)

11. World Self Medication Industry; Benefits of Responsible Self Medication 2009 http://www.wsmi.org/publications.htm(Accessed on 27/03/2011)

12. Filho L, Antonio I, Lima-Costa MF, Uchoa E. Bambui Project: aqualitative approach to self-medication. *Cad SaudePublica* 2004; 20: 1661-9.

13. Caamano F, Figueiras A, LadoLema E, Gestalo-Otero JJ. Self-medication: Concept and "User" Profile. *Gac. Santi*.2000; 14(4): 294-299

14. Sharma R, Verma U, Sharma CL, Kapoor B. Self medication among urban population of Jammucity. *Indian J Pharmacol* 2005; 37:37-45.

15. S KayalvlizhiI, R Senapathi ; Evaluatin of the Perception , attitude and knowledge about Self-medication among business students in 3 select cities, South India.*International Journal of Enterprise and Innovation Management Studies (IJEIMS)*2001; 1: 40-44

Low-level Laser Therapy in the Management of Diabetic Sensorimotor Polyneuropathy

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Abstract

Background & Objective:Diabetes Mellitus is one of the most common progressive and disabling diseases. Population affected with Diabetes may experience numbness or insensitivity to pain and temperature, a tingling, burning or prickling sensation, sharp pains or cramps, extreme sensitivity to even a light touch, loss of balance and coordination. Low-Level laser therapy (LLLT) has been advocated for the treatment of chronic pain disorders. This therapy has been suggested for relief of symptoms of pain, inflammation and utilized in wound healing & nerve regeneration. With this evidence Laser has been advocated in this study. The aim of this study is to evaluate the effectiveness of Low-Level Laser Therapy for relieving the symptoms of Diabetic Sensorimotor Polyneuropathy. Methodology: This randomized controlled trial was conducted in a private Medical College Hospital, Chennai. The materials required for conducting the study includes Tuning Fork, Reflex Hammer, 10gm Semmes Weinstein monofilaments, Goggles and a Ga As LASER unit. The study was conducted among 40 subjects satisfying selection criteria in the age group of 40-60 years and was randomly assigned in to control(Group-A) or experimental group(Group-B) and was assessed for degree of neuropathy and pain using Toronto clinical neuropathy score and Numerical Pain Rating Scale (NPRS) respectively. Participants in the respective groups are treated for five weeks with 4 joules for 4 days in a week. Results: Within-group analyses showed a significant difference in both outcome measures with $p < 0.05$. The pre-test mean in Group-A was 9.80 and post-test mean value of Toronto Clinical Neuropathy Score is 8.25 and in the Group-B the pretest mean was 10.10 and post-test mean was 6.30 this shows that Toronto Clinical Neuropathy Score in group B were comparatively significantly less than group A, $P<0.05$. The Post Test mean value of Numerical Pain Rating Scale in group A is 5.15 and in the group, B is 3.90 compared to their pre-test values of 6.25(Group-A) and 6.30(Group-B) respectively. The Numerical Pain Rating Scale analysis in Group B were comparatively significant than Group A, which indicates a significant difference between groups with $p < 0.05$. Conclusion: This study concludes that Low-Level Laser Therapy is more effective in patients with Diabetic sensorimotor Polyneuropathy in reducing Pain and relieving symptoms.

Keywords: *Diabetic Sensorimotor Polyneuropathy, Low-Level Laser Therapy*

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INTRODUCTION

Diabetes is one among the most progressive and disabling disease. Recently 150 million people were with diabetes all over the world and in the year 2025, their number is expected to increase to 300 million (WHO)

[1]. Diabetic sensorimotor polyneuropathy is 27.6% prevalent among those with diabetes [2]. It was also noted that 13% of persons with glucose tolerance impairment had polyneuropathy, which suggests that neuropathy can also be developed due to the pre-diabetic state caused by impaired glucose tolerance [3]. In another population-based study conducted among diabetic cohorts, it was recorded that 25-30% had peripheral neuropathy graded to be either moderate or severe. [4]

Distal symmetrical neuropathy is also termed as sensorimotor neuropathy and is one of the most common types of diabetic neuropathy. The affected individual develops pain which may be worst at night, impaired or loss of sensation, disturbance in balance and coordination. The symptoms may be predominant in the distal part of the leg and hands which may progress later proximally. The Lower limb is likely to be affected first than the upper limb. Diabetic Peripheral neuropathy can also produce hyperalgesia. Chronic painful neuropathy symptoms may affect the individual's quality of life and can be a factor to induce stress, anxiety, depression and reduced mobility. [5] Sensorimotor neuropathy or distal symmetrical neuropathy is often termed based on their clinical appearance as a stocking-glove neuropathy and in this case, distal long nerves are affected first and later progress proximally [6].

Painful symptoms of Diabetic neuropathy is often resilient to medications. Analgesics and various other drugs are recommended to manage symptoms of pain, such as phenothiazine's, anticonvulsants, and tricyclic antidepressants, which might induce numerous adverse effects. Low-level laser therapy (LLLT), is a form of physiotherapy practice which is widely used for tissue healing, pain, and inflammation, and this therapy is classified in the group of "Other physical therapies in the management of diabetic peripheral neuropathy" [7].

Symptoms associated with early pathophysiological stages of Diabetic Sensorimotor Polyneuropathy can be measured using the Toronto Clinical Neuropathy Score because of its content validity and of construct validity towards nerve conduction velocity measures [8, 9]. The Toronto Clinical Neuropathy Score has been used widely in clinical trials because of its reliability, user-friendliness, and acceptability by patients and also essential for its ability to identify the intensity of clinical stages associated with Diabetic Sensorimotor Polyneuropathy and its progression [10].

The objective of the study is to find out the effectiveness of low-level laser therapy in the management of distal symmetrical diabetic neuropathy.

METHOD

The study was conducted in the Physiotherapy Out Patient Department of a private medical college teaching Hospital at Chennai. The study was approved by the Institutional Human Ethical Committee of the University. The participants were selected randomly and assigned to the groups based on a block randomization procedure. The materials required for conducting the study includes Tuning Fork, Reflex Hammer, 10gm Semmes Weinstein monofilaments, Goggles, and a LASER therapy unit. The Population who satisfy the selection criteria attending the outpatient department of the study centre were included in the study. They were grouped into two, one as control N=20 (Group-A) and the other as intervention group N=20 (Group-B). The selection criteria include Participants with known type2 diabetes mellitus with more than 10 years duration aged between 40-60 years, presenting with diabetic neuropathy symptoms based on the Toronto Clinical Neuropathy Score [11]. Population presenting with gangrene, unstable medical conditions (e.g., malignancy, active/untreated thyroid disease), and other neurologic problems that might interfere with the assessment of neuropathy, Metallic implants, Chronic Alcohol or illicit drug abuse were excluded from the study [12].

All participants were explained about the procedure and informed consent was obtained. The outcome measures used were Toronto clinical neuropathy score to measure the degree of neuropathy [6, 7] and Numerical Pain Rating Scale (NPRS) to measure pain [13]. Both outcome measures were tested by a clinical physiotherapist blinded to group allotment before and after an intervention.

Intervention:

The control group-A did not receive any Physiotherapy intervention, they received only standard drug routine as prescribed by the physician to alleviate the symptoms associated with Diabetic neuropathy. The interventional group-B received LLLT along with the standardized medications to alleviate the symptoms associated with Diabetic neuropathy. All the participants of the group-B were explained about the nature of the

treatment and need to wear goggles throughout the treatment to obviate any risk of accidental application of laser beam into the eye was informed. Laser apparatus is positioned and goggles were given to the patient. The patient is made to lie down in a comfortable position. Treatment area was cleaned with alcohol to remove any material that might absorb or reflect the radiation. The following parameters were used with laser source by a Gallium Arsenide: wavelength of 904 nm, the maximum power of 25 W, a pulse duration of 100 ns and frequency of 1,000 Hz. The treatment was for 4days/week for 5 weeks with an energy dose of 4 joules [14] for 60 sec. at each point. The therapy was applied by positioning the diode applicator with 1 cm^2 diameter and at four located points along the sciatic nerve in each lower extremity. The Laser was kept in contact with the tissues and the beam was applied at right angles on treatment areas. Single point or spotting method of application was applied. Laser was spotted around the neck of the fibula just below the head of the fibula for common peroneal nerve, for deep peroneal nerve Laser was spotted between extensor hallucis longus and extensor digitorum longus, for posterior tibial nerve Laser was spotted just behind and distal to the medial malleolus, for superficial peroneal and Laser was spotted over lateral aspect of the Achilles tendon across the lateral malleolus and medial malleolus to the medial aspect of the Achilles tendon. The device is switched off before removing the applicator from the skin [12], [15].

Clinical findings and Results:

Table -1:Pre-test & Post-test values comparison between Groups –A (Control group)

Group A		Mean	Standard deviation	t value	Significance
Toronto Clinical Neuropathy Scores	Pre-test	9.80	1.54	7.33	<0.05
	Post-test	8.25	1.21		
Numerical Pain Rating Scale	Pre-test	6.25	1.01	5.39	<0.05
	Post-test	5.15	0.81		

Table- 2: Pre-test & Post-test values comparison between Groups –B (Interventional group)

Group B		Mean	Standard deviation	t value	Significance
Toronto Clinical Neuropathy Scores	Pre test	10.10	1.51	15.67	<0.05
	Post test	6.30	1.59		
Numerical Pain Rating Scale	Pre test	6.30	0.86	7.05	<0.05
	Post test	3.90	1.25		

The student t-test is used for statistical analysis. From statistical analysis, the quantitative data revealed a statistically significant difference between the Group A & Group B, and also within the group. The post-test mean value of Toronto Clinical Neuropathy Score in Group A is 8.25 and in the Group, B is 6.30 this shows that Toronto Clinical Neuropathy Score in Group B was comparatively significant than group A, P<0.05. The Post Test mean value of Numerical Pain Rating Scale in Group, A is 5.15 and in the Group, B is 3.90. This pain outcome results also proves that the mean score of Numerical Pain Rating Scale in Group B was comparatively significant than Group A, P<0.05.

Table- 3:Post-test values comparison between Groups A & B

The post-test measure of mean and standard deviation for Toronto Clinical Neuropathy Score,

Numerical Pain Rating Scale in Group A and Group B in respect with 't' value (student 't' test)

Parameter	Post Test Values				't' test	Significance
	Group A		Group B			
	Mean	Standard deviation	Mean	Standard deviation		
Toronto Clinical Neuropathy Score	8.25	1.21	6.30	1.59	5.86	<0.05
Numerical Pain Rating Scale	5.15	0.81	3.90	1.25	3.74	<0.05

Statistical Analysis of Toronto Clinical Neuropathy Score and Numerical Pain Rating Scale post-test scores analyzed with unpaired t-test showed significant difference between Group A and Group B. The analyzed data reveals that the interventional group(A) had better recovery in pain and symptoms compared to control group(B).

DISCUSSION

The study results showed significant improvement with LLLT with 4 joules of irradiation, no significant adverse effects were reported in any of the groups. Therefore, LLLT could be offered safely to patients with diabetic neuropathy.

The Toronto clinical neuropathy scale and numerical rating scale was followed as outcome measures to analyze the alleviation of symptoms associated with distal symmetrical sensorimotor neuropathy. The outcome of the study proved a significant decline in symptoms and pain associated with diabetic neuropathy in all the participants.

Despite various pharmacological treatment approaches to manage the symptoms associated with diabetic neuropathy is available, the safety of long-term advocacy of drugs without side effects is arguable. Moreover, physical measures of treatment for this condition has a dearth in literature support and there is a lacuna in physiotherapy intervention for managing diabetic neuropathy. In this study, LLLT with a dosage of 4j/cm^2 was taken and studied for its significance in the selected population based on its proven neuro-regenerative effects.

Further multidimensional studies would be very beneficial since diabetes induced peripheral neuropathy is a condition involving multiple symptom which may affect autonomic function, sensation and motor function and future studies may direct towards functional outcome through this modality.

Anders et al. underwent study on Neuro regenerative and Neuroprotective effects of low-level laser and concluded that there is massive axonal sprouting and increase in various molecules such as growth associated protein – 43 (GAP- 43), calcitonin gene-related (CGRP) and transforming growth factors betal. They concluded that laser irradiation activates the proliferation of the Schwann cells which will help in process of nerve regeneration. [16]

Various other studies have also reported the effect of Laser irradiation in diabetic neuropathy and the physiological association related to its pathological changes provides evidence of laser irradiation facilitating collagen synthesis, altering DNA synthesis, and improving the function of degenerated neuron and also by facilitating ATP synthesis, improving serotonin and endorphins, promotion of anti-inflammatory mechanisms by reducing prostaglandin synthesis. This process of cellular alterations may also help tissue in improving local circulation, by reducing inflammation which in turn reduces pain [17], [18],[19

Peric et al[11], and Zinman et al [12] from their study results concluded that LLLT does not produce significant improvement in symptoms and pain associated with Diabetic polyneuropathy. In contrary this study established a significant effect of LLLT on relieving symptoms and decreasing pain on distal symmetric polyneuropathy. In a study done by Enwemeka et al. reported that laser therapy was highly effective for tissue repair and pain relief [20].

Morshedi et al. demonstrated that the low-level laser therapy is an effective mean of treatment for pain and inflammation to a target tissue without any adverse effects if the criteria of therapeutic parameters are followed appropriately [21]. Similarly our study also did not show any adverse reactions to laser therapy. Considering the absence of any significant adverse event with LLLT, Further studies are needed to investigate the effect of LLLT on Distal Symmetric Polyneuropathy of varied sternness. One of the significant limitation of our study was small sample size and follow up. Upon further follow-up studies, LLLT can be a recommendable choice of modality in treating Distal Symmetric Polyneuropathy of diverse severity. Although this study demonstrated a significant improvement in pain and symptoms associated with diabetic neuropathy with low-level laser therapy, the observed trend warrants further investigation. The exact mechanism related to the progression of the condition is still debatable.

CONCLUSION

Results of the present study recommend Low-Level Laser Therapy as an effective treatment procedure for Diabetic sensorimotor Polyneuropathy in reducing Pain and relieving symptoms.

Conflict of Interest: None

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REFERENCES

[1] Incidence of diabetes - WHO; 2018; http://www.who.int/mediacentre/factsheets/fs138/en/

[2] William J. Kneebone. Practical Applications of Low-Level Laser Therapy, Practical pain management 2011; 6(8).

[3] Albers JW, Herman WH, Pop-Busui R, Feldman EL, Martin CL, Cleary PA, Waberski BH, Lachin JM. Diabetes Control and Complications Trial/ Epidemiology of Diabetes Interventions and Complications Research Group (2010). Diabetes Care 33:1090–1096.

[4] Davies M, Brophy S, Williams R, Taylor A. The Prevalence, Severity, and Impact of Painful Diabetic Peripheral Neuropathy in Type 2 Diabetes. Diabetes Care. 2006; 29(7):1518- 1522.

[5] National Diabetes Information Clearinghouse (NDIC) Diabetic Neuropathies: The Nerve Damage of Diabetes, 2013; Version-03.

[6] Mayfield JA, Sugarman JR.The use of Semmes-Weinstein monofilament and other threshold tests for preventing foot ulceration in persons with diabetes. J FamPract.2000; 49(11 suppl):17-29

[7] Boulton MJA, -Management of diabetic peripheral neuropathy. Clinical Diabetes. 2005; 23(1):9-15.

[8] Perkins BA, Olaleye D, Zinman B, Bril V. Simple screening tests for peripheral neuropathy in the diabetes clinic. Diabetes Care. 2001; 24: 250–256.

[9] Bril V, Perkins BA. Validation of the Toronto Clinical Scoring System for diabetic polyneuropathy. Diabetes Care. 2002; 25: 2048–2052.

[10] Bril V, Buchanan RA. Aldose reductase inhibition by AS-3201 in sural nerve from patients with diabetic sensorimotor polyneuropathy. Diabetes Care. 2004; 27: 2369–2375.

[11] Zoran perić, Bratislav Cvetković. Electrophysiological evaluation of low-intensity laser therapy in patients with diabetic polyneuropathy, Medicine and Biology. 2006; 13(1):11 - 14

[12] Zinman LH, Ngo M, Ng ET, Nwe KT, Gogov S, Bril V. Low-Intensity Laser Therapy for painful symptoms of diabetic sensorimotor polyneuropathy, Diabetes Care 2004;27:921–924.

[13] National Institutes of Health Warren Grant Magnuson Clinical Centre Pain Intensity Instruments. http://www.mvltca.net/presentations/mvltca.pdf.

[14] Prathap S, Maiya A, Saraswathi P, Dare J. Effect of Low Level Laser Irradiation on Motor Nerve Conduction Velocity of Experimentally Induced Diabetic Neuropathy in Wistar Rats. Journal of Pharmaceutical and Biomedical Sciences.2011; 13(12).

[15] Khamseh M, Nooshafarin K, Rokhsareh A. Diabetic distal symmetric polyneuropathy: Effect of low-intensity laser therapy. Lasers in Medical Science 2011; 26(6):831

[16] Anders j. Low power laser irradiation alters the rate of regeneration of rat facial nerve, Laser in

surgery and medicine 1993; 13:72-82.

[17] Hopkins JT, McLoda TA, Seegmiller JG, David Baxter G Low-level laser therapy facilitates superficial wound healing in humans: a triple-blind, sham-controlled study. J Athl Train 2004; 39(3):223–229

[18] Wang G. Low-Level Laser Therapy (LLLT): Technology Assessment (2004). http://www.lni.wa.gov/claimsins/files/omd/llltechassessmay032004.pdf.

[19] Simunovic Z, Low-level laser therapy with trigger points technique: a clinical study on 243 patients. J Clin Laser Med Surg 1996; 14(4):163–167

[20] Enwemeka CSPJ, Dowdy DS, Harkness EE, Sanford LE, Woodruff LD. The efficacy of low-power lasers in tissue repair and pain control: a meta-analysis study. Photomed Laser Surgery 2004; 22(4):323–329

[21] Morshedi H Low-level laser therapy (LLLT) for chronic low back pain (LBP). European Journal of Scientific Research 2009; 29(1):76–81.

Expression of miR-21 and its Target Gene Bcl-2 in Oral Squamous Cell Carcinoma

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ABSTRACT

Cancer is the word that is scaring the humanity. With the increase in the consumption of tobacco and related products the incidence of Oral cancer is increasing globally. Late diagnosis, invasion and metastasis are factors that contribute to poor prognosis of oral cancer. Early diagnostic markers and targeted therapy are the need of the hour to reduce the morbidity and mortality caused owing to oral cancer. MicroRNAs are emerging biomarkers for both diagnosis and prognosis of various human cancers. The present study aimed at quantification of microRNA21 (miR-21) and expression of Bcl-2 in oral squamous cell carcinoma (OSCC) and their paired normal tissues. miR-21 was significantly upregulated in OSCC compared to its paired normals ($p< 0.00$). Increased expression of Bcl-2 was noted in miR-21 upregulated cases of oral squamous cell carcinoma. The expression of miR-21 was associated with tobacco use (smoking) and nodal metastasis. Our results suggest that miR-21 is upregulated in the OSCC and controls apoptosis by upregulating Bcl-2 gene thereby playing a major role in disease progression.

***Keywords**: MicroRNA, Oral cancer, Apoptosis, miR-21, qRT-PCR*

INTRODUCTION

Oral cancer is a major health burden; ranking the third most common cancer in the Indian subcontinent, accounting for 30% of the global incidence of new cases per annum[1]. Oral carcinoma includes the carcinomas of lip, oral cavity and oropharynx of which the oral squamous cell carcinoma(OSCC) accounts for 90% of cases[2]. The highest risk factors of the disease include tobacco; in both smoking and smokeless forms, betel quid, areca nut and alcohol[3, 4]. Early diagnosis is still challenging in developing countries due to lack of awareness. Even with combined treatment modalities, the five-year survival rate has remained less than 50% which can be attributed to the late diagnosis, disease spread and lack of molecular markers for early diagnosis and targeted therapies[5].

MicroRNAs are small group of non-coding RNAs that possess the ability to regulate gene expression post transcriptionally. Though microRNAs do not code for proteins they control protein synthesis by pairing with the target mRNAs and affect the translation process. They simultaneously control hundreds of genes with their partial complementarity thereby influencing vital physiological processes from cell division to apoptosis[6,7]. A wide range of studies have shown deregulation of microRNAs in cancer and their expression signatures are associated with tumor type, grade and clinical outcomes[8]. Located on chromosome 17q 23.2 MicroRNA 21 is a widely studied oncogenic RNA which targets various downstream regulators like Fas-L, PTEN, PDCD4, AKT, TPM1, BCL2, MMPS ETC that involve in carcinogenesis and its upregulation has been

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demonstrated in hematologic and solid malignancies. Furthermore, miR-21 resists anticancer drug therapy in pancreas, colon, lung and bladder cancer[9]. Having acquired the above knowledge, we evaluated the expression of miR-21 and its target gene Bcl-2 in OSCC with a motive to evolve a clinical biomarker for oral cancer.

MATERIALS AND METHOD

Patient and tissue Samples

The study was approved by the Institutional ethical committee [IEC-N1/12/MAR/27/10] before the commencement of sample collection. Twenty-five Tumor samples and paired normal tissue were collected from the patients during surgical removal of the lesion with prior informed consent. Tissues were immersed in RNA*later* (Sigma Aldrich) and stored in -40ºC until further PCR analysis. Remaining lesion was fixed in formalin and routinely processed and embedded in paraffin wax blocks for IHC staining. The clinic-pathological data was obtained from the medical records department. (Table 1)

Quantitative Reverse Transcription PCR

The tissues were homogenized with 1ml of trizol (Invitrogen) and the total RNA extracted was quantified using Nano Drop 2000 Spectrophotometer (ThermoScientific). cDNA was synthesized from 1µg of total RNA using stem loop RT primers with primescript RT kit (Takara Bio Inc-Japan). The PCR amplification was performed using the Applied Biosystems 7500 Real-Time PCR Detection System according to the manufacturer's instructions. Primers for mir21 was 5'-UAGCUUAUCAGACUGAUGUUGA -3'. U6(snRNA) was used as reference gene for normalization. Results were expressed as mean and standard deviation. Standard curves were generated and the relative amount of miR-21 was normalized to U6 snRNA. We analyzed the expression levels of miR-21 in Oral cancer tissues relative to non-tumor controls using the 2-ΔΔCt method (Livak method). When the fold value was >1, there was an increased expression of miR-21 in the cancer tissues compared to their non-tumorous counterparts.

Immunohistochemistry

The tissue sections were deparaffinized in xylene and dehydration in a series of absolute alcohol each for 5 min. Peroxide block (Biogenex life sciences Pvt Ltd) was used to block endogenous peroxide and antigen was retrieved using pressure cooker. The Sections were incubated with rabbit monoclonal antiBcl-2 primary antibody (clone-100) (Biogenex life sciences Pvt Ltd) for 45 mins at 25°C followed by secondary antibody for 30 minutes. Subsequently the sections were washed, stained with DAB chromogen, counterstained with Harris hematoxylin, dried and mounted with DPX. Tonsil tissue sections were used as positive control. An internal negative control was used to validate the staining.

In the Bcl2 positive cells the antibody stained the cytoplasm brown against a blue background. The staining was scored as 0 (negative staining), 1+ (mild), 2+ (moderate) and 3+(intense). The slides were scored by two pathologist and H (Histo) score was calculated for all the sections[10].

Statistical Analysis

All the statistical analysis was performed using SPSS software version 17.0. The values were represented as mean and standard deviation. Correlation between miR-21 expression and the clinic-pathological features was analyzed using chi- square test. The interobserver variation was calculated with Cohen's kappa coefficient. Kruskal-Wallis Test was performed to calculate the fold change in microRNA expression. A p-value less than 0.05 was considered statistically significant.

RESULTS

Expression of miR-21 in OSCC patient

Only 23/25 samples were quantified by PCR analysis. 2 samples did not work even after multiple trials. The study results showed a significant upregulation ($p < 0.00$) of miR-21in OSCC tissues relative to its adjacent normal samples. With a relatively stable expression of miR-21 in the paired normal tissue, a mean fold change of 17.39 was noted in its expression in the OSCC samples ($p < 0.000$). (Figure 1)

Immunohistochemistry

Bcl-2 expression was higher in tumor tissues compared to normal (($p < 0.02$). About 92.3% of miR-21 upregulated cases showed a positive expression for Bcl-2 with a highly significant miR-21/ Bcl-2 ratio ($p < 0.000$). Though 40% of normal tissues were positive for Bcl2 only the basal cells of the epithelium showed the expression of the protein. (Figure 2) The interobserver

variation or the measurement of agreement (kappa score-0.828 & 0.940) between the observes was statistically analyzed and was highly significant ($p < 0.000$)

Association of mirR-21 and Bcl-2 expression and clinical features:

We also analyzed the association between miR-21and Bcl-2 expression with the clinico-pathological parameters. The mean age of the samples was 55.16 years with 19 males and 6 females. A significant upregulation of miR-21 was noted among men (76.5%) compared to women ($p < 0.001$) and miR-21 expression was strongly associated with smoking ($p < 0.001$). Though it was not statistically significant it was observed that patients with moderately differently OSCC(MDOSCC) exhibited higher expression of miR-21(77.8%) compared to other grades of tumor. upregulation of miR-21 was noted in tumors with nodal metastasis ($p < 0.007$). Expression of Bcl-2 was higher in men (73.7%) ($p < 0.01$) and smokers (91.7%) ($p < 0.002$) and increased significantly with increasing grade of nodal metastasis ($p < 0.006$). There was no correlation between the age, tumor site, tumor size and tumor grade with the Bcl-2 expression. (Table2)

Table 1. Clinicopathologic characteristics in Oral SCC patients (N= 25)

Characteristics	**N(%)**
Age in years	55.16 (mean)
< =40	3
41- 60	12
>60	10
Gender	
Male	19(76)
Female	6 (24)
Location	
Buccal mucosa	12(48)
Tongue	7(28)
Lip	2(8)
Alveolus	3(12)
Floor of mouth	1(4)
Smoking	
Positive	12(48)
Negative	13(52)
Tumor size	
T1	12(48)
T2	11(44)
T3	0(0)
T4	2(8)
Nodal status	
N	7(28)
N1	12(48)
N2	6(24)
Tumor grade	
WDOSCC	14(56)
MDOSCC	9(36)
PDOSCC	2(8)

***Cont.*. Table 1.**

Abbreviations: WDOSCC- Well differentiated squamous cell carcinoma, MDOSCC- Moderately differentiated squamous cell carcinoma, PDOSCC- Poorly differentiated squamous cell carcinoma.

Table 2 : Clinicopathologic comparison of miR-21 and Bcl-2 expression in OSCC

			miR-21			**N=25**	**Bcl-2**		**P-value**
Characteristics	**N=23**	**Upregulated**	**Downregulated**	**Equal**	**P-value**		**Positive**	**Negative**	
Age in years									
< = 40	3	1(33.3%)	1(33.3%)	1(33.3%)	0.816	3	1(33.3%)	2(66.7%)	0.517
41 - 60	11	7(63.6%)	3(27.3%)	1(9.1%)		12	7(58.3%)	5(41.7%)	
> 60	9	5(55.6%)	3(33.3%)	1(11.1%)		10	7(70%)	3(30%)	
Gender									
Male	17	13(76.4)	4(23.6)	0(0%)	0.001*	19	14(73.7%)	5(26.3%)	0.01*
Female	6	0(0%)	3(50%)	3(50%)		6	1(16.7%)	5(83.3%)	

Cont... **Table 2 : Clinicopathologic comparison of miR-21 and Bcl-2 expression in OSCC**

Location									
Buccal mucosa	11	7(63.6%)	2(18.2%)	2(18.2%)		12	9(75%)	3(25%)	
Tongue	6	4(66.7%)	1(16.7%)	1(16.7%)	0.367	7	4(57.1%)	3(42.9%)	0.222
Lip	2	0(0%)	2(100%)	0(0%)		2	0(0%)	2(100%)	
Alveolus	3	1(33.3%)	2(66.7%)	0(0%)		3	1(33.3%)	2(66.7%)	
Floor of mouth	1	1(100%)	0(0%)	0(0%)		1	1(100%)	0(0%)	
Smoking									
Positive	10	10(100%)	0(0%)	0(0%)	0.001*	12	11(91.7%)	1(8.3%)	0.002*
Negative	13	3(23.1%)	7(53.8%)	3(23.1%)		13	4(30.8%)	9(69.2%)	
Tumor size									
T1	11	3(27.35)	5(45.5%)	3(27.35)	0.79	12	5(41.7%)	7(58.3%)	0.153
T2	10	8(80%)	2(20%)	0(0%)		11	8(72.7%)	3(27.3%)	
T4	2	2(100%)	0(0%)	0(0%)		2	2(100%)	0(0%)	
Nodal status									
N0	7	0(0%)	5(71.4%)	2(28.6%)	0.007*	7	1(14.3%)	6(85.7%)	
N1	11	8(72.7%)	2(18.2%)	1(9.1%)		12	8(66.7%)	4(33,3%)	0.006*
N2	5	5(100%)	0(0%)	0(0%)		6	6	0(0%)	
Tumor grade									
WDOSCC	12	4(33.3%)	5(41.7%)	3(25.0%)	0.159	14	7(50%)	7(50%)	0.353
MDOSCC	9	7(77.8%)	2(22.2%)	0(0%)		9	6(66.7%)	3(33.3%)	
PDOSCC	2	2(100%)	0(0%)	0(0%)		2	2(100%)	0(0%)	

* 23/25 cases only worked for PCR analysis. p values were calculated by Pearson chi square test and are charted out in the table. P value < 0.05 is considered statistically significant**.**

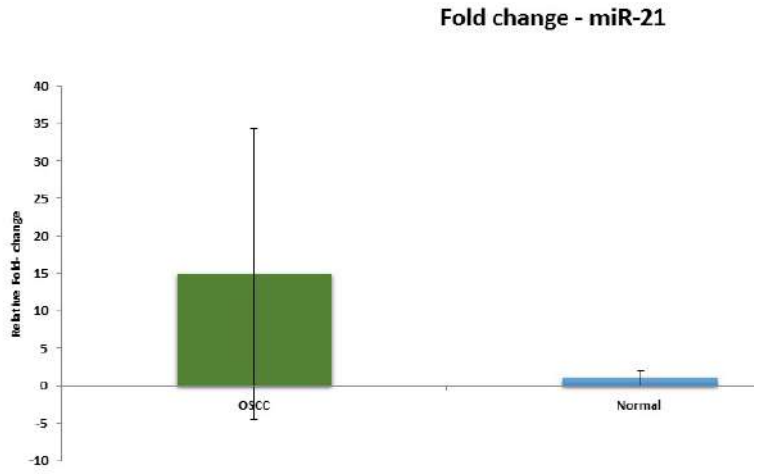

Figure1: RT-qPCR of miR-21 expression depicting Fold change of miR-21 in OSCC compared to its adjacent normal tissues

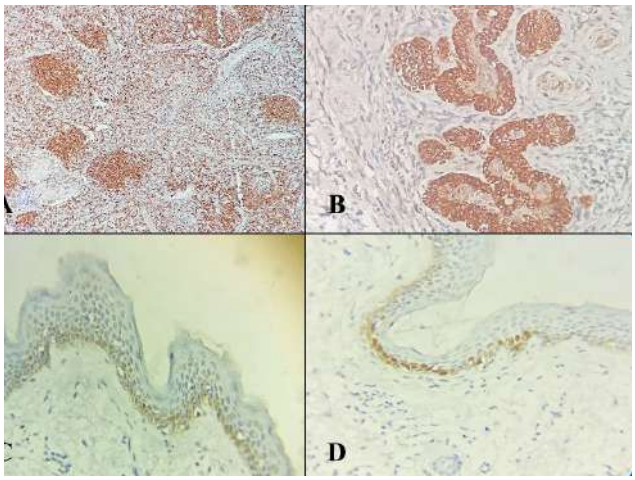

Figure 2: (A) Section showing Positive staining of Bcl-2 in tonsil tissue (positive control) (10XVIEW: IHC), (B) Intense staining of Bcl-2 in dysplastic islands of OSCC. (C & D) Mild and moderate staining of Bcl-2 in the basal cell of the Normal oral epithelium (20XVIEW: IHC)

DISCUSSION

MicroRNAs are novel gene regulators that play major role in development and physiology[11]. Studies have shown that miR-21 is significantly upregulated in head and neck cancers and is associated with disease progression and patient survival[12]. In this study we analyzed the expression of miR-21 in OSCC and found that it is significantly overexpressed in tumors compared to its paired normal proving a possible role played in the initiation of the disease. A similar study conducted on laryngeal SCC published results which demonstrated a significantly higher expression of miR-21 in cancer tissues than the normal tissue which was consistent with our data[13]. miR-21 was 17.39 fold elevated in OSCC than its paired normal in our study. This value is intermediate between 8.29-fold and 37.89-fold elevation in early and advance tongue SCC as reported by Li et [14].

Current Study results showed that 100% of the smokers had a higher miR-21 expression when compared to the patients who did not smoke. Smoking tobacco is one of the major risk factors for OSCC and recent study by Zhang et al has demonstrated a nicotine induced upregulation of miR-21 in esophageal cell line by targeting the EMT transforming growth factor beta (TGF-β)[15]. Thus it can be hypothesized that upregulation of miR-21 could be one of the process by which tobacco initiates oral carcinogenesis. In addition to tumor initiation, miR-21 plays a vital role in cancer cell migration, invasion and lymph node metastasis[16]. Our study showed that patients with lymph node metastasis exhibited higher expression of miR-21 suggesting that miR-21 is related to cancer progression as demonstrated by Li et al in tongue Squamous cell carcinoma. Over-expression of miR-21 promoted proliferation, migration, and invasion of colorectal cancer cells which could be the justification for increased lymph node metastasis in miR-21 upregulated cases of our study[17]. In relation to the grade of the tumor and microRNA expression, it was found that the miR-21 expression was higher in MDOSCC and PDOSCC whereas WDOSCC cases showed comparatively low expression of miR-21. This kind of expression pattern suggests the role of miR-21 in the progression of the disease and eventually poor prognosis.

Evasion of apoptosis aids in cancer cell survival. Upregulation of miR-21 is indirectly involved in apoptosis by regulating the genes that are responsible for these processes in a variety of tumors[18]. Knockdown of miR-21 in glioblastoma cells triggered an increase in apoptotic cell death, suggesting that miR-21 acts as an anti-apoptotic factor[19]. Bcl-2 is a gene that codes for a specific protein that inhibits apoptosis. Our results showed an increased expression of Bcl-2 (60%) in OSCC compared to the paired normal tissue (48%). About 90% of the miR-21 upregulated cases showed positive expression for Bcl-2 which proves an association between the genes. MicroRNA 21upregulation increased the expression of Bcl-2 and miR-21 knockdown induced apoptotic cell death in lung Squamous cell carcinoma cells[20]. Inhibition of miR-21 resulted in significantly lower levels of Bcl-2 protein in human gastric and pancreatic adenocarcinoma cells[21,22]. Our study proves that Bcl2 is a direct target for miR-21. These data suggest that miR-21 exerts a potential role in oral carcinogenesis

CONCLUSION

In conclusion, miR-21 promotes oncogenesis and is overexpressed in oral squamous cell carcinoma tissues compared to their adjacent normal tissue. Increased expression of anti-apoptotic gene Bcl-2 is noted in miR-21 upregulated cancer tissues suggesting its possible role in evading apoptosis thereby favoring cancer progression. Higher lymph node metastasis in miR-21 positive cases addresses the role of this microRNA in tumor invasion and metastasis. Therefore, miR-21 can be considered as important clinical biomarkers for OSCC and their implications in targeted therapies is a new avenue for Oral cancer research.

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REFERENCES

1. Tandon P, Dadhich A, Saluja H, Bawane S, Sachdeva S. The prevalence of squamous cell carcinoma in different sites of oral cavity at our Rural Health Care Centre in Loni, Maharashtra–a retrospective 10-year study. Contemporary Oncology. 2017;21(2):178.
2. Maulina T, Iskandarsyah A, Hardianto A, Sjamsudin E, Nandiniet al. The Incidence Of Oral Squamous Cell Carcinoma And Its Relationship With Orofacial Pain In Oral Cancer Patients: wip16–0122. Pain Practice. 2016 May 1;16:11
3. Rivera C. Essentials of oral cancer. International journal of clinical and experimental pathology. 2015;8(9):11884.
4. Scully C, Bagan J. Oral squamous cell carcinoma overview. Oral oncology. 2009;45(4/5):301-8.
5. Le Campion AC, Ribeiro CM, Luiz RR, da Silva Júnior FF, Barros HC et al. Low survival rates of oral and oropharyngeal squamous cell carcinoma. International journal of dentistry. 2017;2017.
6. He L, Hannon GJ. MicroRNAs: small RNAs with a big role in gene regulation. Nature Reviews Genetics. 2004 Jul;5(7):522.
7. Pillai RS. MicroRNA function: multiple mechanisms for a tiny RNA? Rna. 2005 Dec 1;11(12):1753-61.
8. Peng Y, Croce CM. The role of MicroRNAs in human cancer. Signal transduction and targeted therapy. 2016 Jan 28; 1:15004.
9. Feng YH, Tsao CJ. Emerging role of microRNA-21 in cancer. Biomedical reports. 2016 Oct 1;5(4):395-402.
10. Hirsch FR, Varella-Garcia M, Bunn Jr PA, Di Maria MV, Veve R et al. Epidermal growth factor receptor in non–small-cell lung carcinomas: correlation between gene copy number and protein expression and impact on prognosis. Journal of clinical oncology. 2003 Oct 15;21(20):3798-807.
11. Shivdasani RA. MicroRNAs: regulators of gene expression and cell differentiation. Blood. 2006 Dec 1;108(12):3646-53.
12. Lubov J, Maschietto M, Ibrahim I, Mlynarek A, Hier M et al. Meta-analysis of microRNAs expression in head and neck cancer: uncovering association with outcome and mechanisms. Oncotarget. 2017 Aug 15;8(33):55511.
13. Hu A, Huang JJ, Xu WH, Jin XJ, Li JP et al. GB. miR-21 and miR-375 microRNAs as candidate diagnostic biomarkers in squamous cell carcinoma of the larynx: association with patient survival. American journal of translational research. 2014;6(5):604.
14. Li J, Huang H, Sun L, Yang M, Pan C et al. MiR-21 indicates poor prognosis in tongue squamous cell carcinomas as an apoptosis inhibitor. Clinical cancer research. 2009 Jun 15;15(12):3998-4008.
15. Zhang Y, Pan T, Zhong X, Cheng C. Nicotine upregulates microRNA-21 and promotes TGF-β-dependent epithelial-mesenchymal transition of esophageal cancer cells. Tumor Biology. 2014 Jul 1;35(7):7063-72.
16. Sun H, Wang P, Zhang Q, He X, Zai G et al. MicroRNA21 expression is associated with the clinical features of patients with gastric carcinoma and affects the proliferation, invasion and migration of gastric cancer cells by regulating Noxa. Molecular medicine reports. 2016 Mar 1;13(3):2701-7.
17. Li C, Zhao L, Chen Y, He T, Chen X et al. MicroRNA-21 promotes proliferation, migration, and invasion of colorectal cancer, and tumor growth associated with down-regulation of sec23a expression. BMC cancer. 2016 Dec;16(1):605.
18. Buscaglia LE, Li Y. Apoptosis and the target genes of microRNA-21. Chinese journal of cancer. 2011 Jun;30(6):371.
19. Chan JA, Krichevsky AM, Kosik KS. MicroRNA-21 is an antiapoptotic factor in human glioblastoma cells. Cancer research. 2005 Jul 15;65(14):6029-33.
20. Xu LF, Wu ZP, Chen Y, Zhu QS, Hamidi S et al. MicroRNA-21 (miR-21) regulates cellular proliferation, invasion, migration, and apoptosis by targeting PTEN, RECK and Bcl-2 in lung squamous carcinoma, Gejiu City, China. PloS one. 2014 Aug 1;9(8): e103698.
21. Gu JB, Bao XB, Ma Z. Effects of miR-21 on proliferation and apoptosis in human gastric adenocarcinoma cells. Oncology letters. 2018 Jan 1;15(1):618-22.
22. Sicard F, Gayral M, Lulka H, Buscail L, Cordelier P. Targeting miR-21 for the therapy of pancreatic cancer. Molecular Therapy. 2013 May 1;21(5):986-94.

Consumer Trust in E-Commerce Transaction in Delhi

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ABSTRACT

Online Shopping in India is an emerging trend for marketers for promoting their merchandise in a wide geographical area using the Internet. India acquired 283.8 million Internet users by 2017. India is now the third largest Internet user after the U.S. and China. Lack of trust is the biggest obstacle to the success of online shopping. The present study focused upon the relationship of trust antecedents with consumer trust and consumer trust with online shopping activities with the help of cross-sectional survey conducted in Delhi. Structural equation modeling (SEM) was used to achieve the results of this research. The results revealed that knowledge and privacy protection did not have a significant relationship with consumer trust. The results revealed that security protection, perceived risk, and perceived benefits are very important antecedents for building trust among the consumers towards online shopping. Consumer trust was found to have a significant relationship with online shopping activities. Finally, some useful implications have been offered for the marketers at the end.

Keywords*: Online shopping, privacy, security, risk, and online trust.*

INTRODUCTION

Online shopping has become very popular for the consumers. This is the new and innovative pattern of shopping. It is not only provides a wide range of products to the consumers, but it also offers a huge market and business opportunities. In the past 05 years, there has been rapid expansion of the Internet and huge growth of Internet users.

Review of Literature

(1) Internet in India: The Internet performs an imperative role in enhancing the level of convenience and novelty. The application of the Internet is boosted significantly due to the speed and level of comfort. It has gained importance as a way of marketing and promotion. It provides a common platform of business transactions for sellers and buyers (Joshi & Achuthan, 2016)[1.] This has given a new dimension to marketing. India gained 290 .8 million Internet users by 2017. India is now the third largest Internet user after the U.S. and China.

(2) Online Shopping: Online shopping is a form of electronic commerce in which a customer buys a products or service by using the Internet instead of going to a traditional brick and mortar store. E-web store, e-shop, Internet shop, online stores are the alternative names of online shopping (Padmanabh, Jeevanda, & Jose, 2016) [2]

Online shopping becomes popular during the Internet boom in 1999-2000. Amazon.com is the first online bookstore. It was founded by Jeff Bezos and created a history by becoming the first bookstore with presence only on the Internet. In India, online transactions are only 8%; whereas, internationally, it is 18%. Hence, there is a lot of potential for the growth of online shopping; 8 million Indians are shopped online in 2018 (Chellappa, R.K. & Pavlou, P.A, 2012)[3]

OBJECTIVES OF THE STUDY

To examine the relationship between knowledge, privacy protection, security, protection, and trust in online shopping.

To ascertain the relationship between perceived risk, perceived benefits, and trust in online shopping.

To examine the influence of consumer trust on online shopping activities.

To develop and validate a comprehensive model on

consumer trust in online shopping activities

Hypothesis of the Study:

H1: Knowledge is positively associated with consumer trust in online shopping.

H2: Privacy protection is positively associated with consumer trust in online shopping.

H3: Security protection is positively associated with consumer trust in online shopping.

H4: Perceived risk has a significant relationship with consumer trust in online shopping.

H5: Perceived benefits have a significant relationship with consumer trust in online shopping.

H6: Consumer trust in online shopping is positively associated with online shopping activities.

Research Methodology and Data Collection

To test the theoretical framework, we examined the influence of trust on online shopping activities. The research participants were online shoppers of Delhi. The research study follows the descriptive research design. A thorough literature review has been done on online shopping in order to identify the antecedents of consumer trust in online shopping. A sample of 300 respondents participated in the study. A well structured and undisguised questionnaire was used for primary data collection. The respondents were requested to assign ratings on a 5-point likert scale from 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree. A total of 400 responses were received. After eliminating incomplete and inappropriate responses, a total of 300 usable responses were included in the sample for construction validation and hypotheses testing.

Reliabilities and Validation: This study measures the seven constructs including knowledge, privacy protection, security protection, perceived risk, perceived benefits, consumer trust, and online shopping activities.

Reliability: Cronbach's alpha value was calculated in order to measure the reliability of these constructs. The Cronbach's alpha of knowledge, privacy protection, security protection, perceived risk, perceived benefits, consumer trust, and online shopping activities are 0.793, 0.789, 0.883, 0.874, 0.938, 0.899, and 0.929, respectively. The construct reliabilities are all within the accepted range, exceeding 0.70.

Content Validity: To ensure content validity, a thorough review of the literature on the subject of the study was conducted. The questionnaire was also pilot tested by expert's review, after which necessary changes were made to improve both content and clarity of the questionnaire.

Construct Validity: Construct validity was examined by assessing convergent validity and discriminant validity. Convergent validity is considered acceptable when all item loadings are greater than 0.50. The cumulative percentage of variance explained by each factor was greater than 63% for all constructs.

Discriminant Validity: The average variance extracted (AVE) can also be used to evaluate discriminant validity. Discriminant validity is checked by examining whether the correlations between the variables are lower than square root of the average variance extracted. All square roots of each AVE value are greater than the off diagonal elements as indicated in the Table 1. It indicates discriminant validity among variables.

Table 1. Discriminant Validity

Constructs	Knowledge	Privacy Protection	Security Protection	Perceived Risk	Perceived Benefits	Consumer Trust	Online Shopping Activities
Knowledge	**0.80**	0.071	0.297	0.194	0.061	0.244	0.036
Privacy Protection		**0.56**	0.154	0.244	0.037	0.089	0.187
Security Protection			**0.70**	0.532	0.129	0.272	0.329
Perceived Risk				**0.65**	0.298	0.266	0.251
Perceived Benefits					**0.84**	0.228	0.074
Consumer Trust						**0.92**	0.089
Online Shopping Activities							0.89

Data Analysis and Results

To test the proposed research model, and for the data analysis of both the measurement model and structural model, we used structural equation modeling (SEM). AMOS analyzes structural equation models, including measurement and structural models with multi item variables.

(1) Demographic Profile of the Respondents: The profile of the respondents is shown in the Table 2. A judgmental sample of 300 respondents was surveyed and their demographics comprised of the following:

Gender Wise: Male respondents: 166 (55%) and female respondents: 134 (45%). Mean is 1.45 and the standard deviation is 0.498.

Age Group Wise: 17-25 years: 64 respondents (21%); 26-35 years: 113 respondents (38%); 36-45 years: 77 respondents (26%); and 45 & above years: 46 respondents (15%). The mean is 2.35 and standard deviation is 0.982.

Occupation Wise: Employees: 95 respondents (32%); Business owners: 111 respondents (37%); Students: 43 respondents (14%); and other occupations: 51 respondents (17%). The mean is 2.17 and the standard deviation is 1.056.

Income Wise (in INR): Below 4 lakhs: 94 respondents (32%); 4-8 lakhs: 91 respondents (30%); 8-12 lakhs: 75 respondents (25%); and 12 lakhs & above category: 40 respondents (13%). The mean is 2.2 and the standard deviation is 1.029. The demographic profile of the respondents is summarized in the Table 2.

Table 2. Demographic Profile of the Respondents.

Categories	Sub categories	Frequency	% age	Mean	Standard Deviation
Gender	Male	166	55	1.45	0.498
	Female	134	45		
	Total	300	100		
Age	17-25 yrs	64	21	2.35	0.982
	26-35 yrs	113	38		
	36-45 yrs	77	26		
	45 & above	46	15		
	Total	300	100		
Occupation	Employee	95	32	2.17	1.056
	Business owner	111	37		
	Student	43	14		
	Other	51	17		
	Total	300	100		
Income	Below 4 lac	94	32	2.2	1.029
	4-8 lac	91	30		
	8-12 lac	75	25		
	12 & above	40	13		
	Total	300	100		

(2) Structural Equation Modeling (SEM): The study developed a theoretical model to study the influence of consumer trust on online shopping activities in Delhi. To confirm whether the following constructs: Knowledge, privacy protection, security protection, perceived risk, and perceived benefits measure consumer trust and consumer trust measures online shopping activities or not, confirmatory factor analysis was used. Confirmatory factor analysis (CFA) was conducted by sing AMOS Statistical Software Package version 18. The method adopted in CFA was maximum likelihood extraction to estimate the CFA model. Various goodness-of-fit measures can be produced by CFA by which a model can be evaluated. CFA is the base of measurement modeling in SEM.

(i) Measurement Model:

The present model examines the various relationships among the measures of constructs including: knowledge, privacy protection, security protection, perceived risk, perceived benefits, trust, and online shopping activities. The value of chi square, degree of freedom, Normed chi square, and other model fit indices including: RMR (root mean resideual), GFI (goodness of fit index), AGFI (adjusted goodness of fit index), CFI (comparative fit index), and RMSEA (root mean square error of approximation) are calculated.

The values of RMR, GFI, CFI, and RMSEA are close to the threshold level. The value of RMR (0.057) is close to 0. The values of GFI (0.755), CFI (0.820), and RMSEA (0.104) reach the cut off criterion. The Normed chi square value is close to the threshold level, but is not satisfactory, and the p-value (0.000) shows the significance. These model fit indices are very important to be taken into consideration because based on these model fit indices values, we were able to ascertain whether the model is fit or not. These values can be improved. Therefore, it leads to another modification of the measurement model.

Further validation of the measurement model was done with the following constructs: Knowledge, privacy protection, security protection, perceived risk, perceived benefits, consumer trust, and online shopping activities. One item of knowledge (K2) has low regression weight less than 0.5 .This item is deleted from the model. All the remaining items have regression weight less than 0.5. This item is deleted from the model. All the remaining items have regression weight more than 0.5, so there is need to delete only one item.

The Table 3 shows the values of RMR, GFI, AGFI, RMSEA, and Normed chi-square that are essential to check the model fit. There are different cut off criteria for each value. The model comprising the measurement items shows adequate fit – RMR (0.058) close to 0, CFI (0.823), and RMSEA (0.107).

Table 3. Fit indices of Multiple Group CFA Analysis for the Measurement Model

GOF Index/Absolute Measure	Measurement Model 1	Measurement Model 2
x^2 (chi-square)	1396.835	1338.394
Degree of Freedom	329	303
Probability	0.000	0.000
GFI	0.755	0.755
RMSEA	0.104	0.107
RMR	0.057	0.058
Normed chi-square (x^2/df)	4.24	4.41
Incremental fir Measures/CFI	0.820	0.823
Parsimony Measures/AGFI	0.698	0.694

There are small changes that occur in the values because only one item was deleted from the model; otherwise, all the values reached the cut off criteria and are significant at p-value. Next was to evaluate the psychometric properties of the model in terms of reliability, convergent validity, and discriminant validity. The AVE value is 0.5, which meets the cut-off criterion.

(ii) Structural Model: Once the validity of the measurement model has been done, then we moved to ascertain the validity of the structural model. Structural theory explains the transition from the measurement model to the structural model in a series of relationships among constructs.

The structural model examines the specifying relationship of the constructs and the nature of each relationship. The relationship between the different variables is represented by a two-headed arrow, but in the structural model, it shows a dependence relationship and a single headed arrow represents it. After employing structural equation modeling (SEM), we need to confirm the relationship between knowledge, security protection, privacy protection, perceived risk, and perceived benefits with consumer trust.

The preliminary analysis of the structural model was tested upon with the final items of the measurement model II. Knowledge, privacy protection, security protection, perceived risk, and perceived benefits are in a relationship with each other. This is shown by covariances between them. This leads to consumer trust and consumer trust further leads to online shopping activities. The model was tested like this for achieving different model fit indices.

Table 4. Fit indices of Multiple Group CFA Analysis for the Measurement Model

GOF Index/Absolute Measures	Measurement Model 1	Measurement Model 2
x^2 (Chi-square)	1484.083	819.938
Degree of Freedom	309	215
Probability	0.00*	0.000*
GFI	0.738	0.825
RMSEA	0.113	0.097
RMR	0.106	0.085
Normed chi-square(x^2/df)	4.8	3.6
Incremental fit Measures/CFI	0.799	0.859
Parsimony Measures/AGFI	0.680	0.694

*5% Level of Significance

The Table 4 shows the parameters, which are considered in declaring the overall model, fit. The values of the parameters are close to the threshold levels. The values of chi square, degree of freedom, Normed chi-square, and other model fit indices including: goodness of fit index (GFI), adjusted goodness of fit index (AGFI), root mean residual (RMR), comparative fit index (CFI), and root mean square error of approximation (RMSEA) are examined. It can be seen from the Table 4 that the values of RMR, GFI, and RMSEA are close to the threshold level and the p-value (0.000) shows significance at the 5% level.

However, the other fit indices could not close enough to conclude the fitness of the model. Hence, the above values can be modified to re-specify the above model. Where RMR is close to 0, RMSEA is less than I, and the Normed chi-square value should be near to 3, but the Normed chi square value is 3.6, which is very close to the threshold level, and which is significant at p-value (0.000). All other model fit indices are also very close to the threshold level and thus, they represent a moderate fit and are significant. The factors loading along with reliability are very high for all the constructs.

DISCUSSION

This study proposed six hypotheses. The H1, H2, and H3 hypotheses help to achieve the first objective of the study, that is, to examine the relationship between knowledge, privacy protection, security protections, and consumer trust in online shopping. H1 helps to examine the relationship between knowledge and trust in online

shopping; H2 helps to examine the relationship between privacy protection and trust in online shopping; and H3 helps to examine the relationship between security protection and trust in online shopping. The results reveal that H1 is rejected, which implies that knowledge is not positively associated with trust in online shopping. Next, H3 is accepted, which implies that security protection is positively associated with trust in online shopping.

The hypotheses H4 and H5 helps us to achieve the second objective, that is, to examine the relationship between perceived risk, perceived benefits, and trust in online shopping. The hypothesis H4 supports that perceived risk has a significant relationship with consumer trust in online shopping. Hypothesis H5 supports that perceived benefits have a significant relationship with trust in online shopping.

The last and the sixth hypothesis, H6 helps us to achieve the third objective, that is, to examine the relationship of consumer trust with online shopping activities. The results of this study show that trust is positively associated with online shopping activities. The last objective to examine the influence of consumer trust on online shopping activities is fulfilled by the R-square value.

CONCLUSION

The results reveal that knowledge and privacy protection are not positively associated with consumer trust. It means there is no effect of knowledge and privacy protections on the consumers' trust. Security protection is positively associated with trust with intention to increase online shopping Activities; perceived risk has a significant relationship with consumer trust in online shopping; perceived benefits are also found to have a significant relationship with trust in online shopping; and consumer trust is positively associated with online shopping activities. Thus, the model and results have many important implications for merchants who wish to build their online businesses by increasing consumer trust.

Managerial Implications

Online vendors can distribute free samples or free subscription for the online shoppers to test their products or services.

The research findings provide data to the marketers about the importance of perceived risk in online shopping.

Security protection is importance to build consumer trust in online shopping.

Managing online customer reviews and feedback are another way to build trust among the customers.

After sales services to the customers can lead to the formation of a magical relationship with customers.

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Ethical Clearance: I testify that my article submitted has not published elsewhere and I actively involved in substantive completion of paper.

REFERENCES

1. Joshi, D., & Achuthan, S. A study of trends in B2C online buying in India. Indian Journal of Marketing, 2016 46(2); 22-35
2. Padmanabh, Jeevanda, & Jose, Factors that affects consumer trust online shopping in Taiwan ;2016 72 (1) ; 24-41
3. Chellappa, R.K. & Pavlou, P.A., Perceived information, financial liability and consumer trust in electronic commerce transactions. Logistics information Management, 2012 15(5-6); 358-368.
4. Gefen, D, E-commerce: the role of familiarity and trust. The International Journal of Management Science, 2014 28(6); 725-737.
5. Gurleen, K., Consumers' perceptions towards online shopping-the case of Punjab. International Journal of Management and Information Technology, 2012 1(1); 1-6.

Knowledge and Awareness of Handling Methyl Methacrylate Monomer among Undergraduate Dental Students

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ABSTRACT

Objective: Methyl methacrylate (MMA) monomer is one of the most widely used chemical in the dental laboratory and handled frequently by dental students. This study was done to assess the knowledge, awareness and handling practices of MMA among the undergraduate dental students of the Faculty of Dentistry, Melaka Manipal Medical College and Manipal College of Dental Sciences, Manipal of Manipal Academy of Higher Education, Manipal.

Methodology: The study sample comprised of 273 dental students. A validated questionnaire with questions pertaining to the knowledge about MMA, facilities of the lab where MMA is handled, personal protective aid to be used while manipulating MMA and any history of allergic experience was distributed among the students. Frequency of response to individual question in the questionnaire was analysed.

R**esults:** 81.2% of the students who participated in the study were aware of the allergic potential of MMA and 89.8% were aware of its highly inflammable nature however, 92.7% were not aware of its neurotoxicity. 64% of the participants were aware of the ventilation system in the lab. 60.4% were aware of the proper storage method and 30.7% of proper disposal technique. More than half of the subjects used safety goggles (62.6%) and gloves (53.4%); but less than half of them used lab coat (21.9%) and mask (29.6%) while handling MMA and 71% of them changed the gloves every day.

Conclusion: Most of the students were aware of the facilities available in their laboratory, protective equipment required while handling and proper storage method of MMA. However, dental students need to enhance their knowledge of Methyl Methacrylate (MMA) in terms of its route of exposure, local and systemic side effects and proper disposal methods.

Keywords: *Methyl methacrylate, MMA, protective equipment, dental laboratory,*

INTRODUCTION

Acrylic resin is used for a variety of applications in dental laboratories. Its major use is in the fabrication of complete or partial dentures. Acrylic resin is supplied in a variety of forms, such as powder: liquid, gels, and sheets. The powder-liquid system of methyl methacrylate (MMA) is the most common form used in dental laboratories[1]. The liquid monomer is a clear, colourless, and flammable chemical and has strong odour described as acrid or pungent[2]. MMA has been reported as a lung, skin, and eye irritant[3], and causes mild axonal degeneration of digital nerves when handled with bare hands before polymerization[4]. In animal studies, after chronic oral exposure to high concentrations of MMA monomer systemic effects, including damage to the central nervous system and liver have been noted[5]. In the

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dental laboratory setup, the primary route of exposure of MMA is inhalation[6].

The toxicity of MMA has been largely studied. However, not many studies have been conducted to assess the knowledge and awareness of handling Methyl methacrylate monomer among dental students. The aim of this study was to thus to assess the awareness and handling practices of acrylic resin among dental students of Melaka Manipal Medical College and Manipal College of Dental Sciences, Manipal.

MATERIAL AND METHOD

A descriptive cross-sectional study was conducted with the help of a validated questionnaire among the undergraduate dental students of Melaka Manipal Medical College and Manipal College of Dental Sciences, Manipal. The study was conducted among 273 dental students. Institutional ethical committee clearance was obtained for the same. An informed consent was taken from the students involved in the study. A validated questionnaire was prepared with questions pertaining to the knowledge of MMA, facilities of the lab where MMA is handled, personal protective aid to be used during the manipulation of MMA and any history of allergic experience which was then distributed among the students. Frequency of response to individual questions in the questionnaire was analysed.

FINDINGS (RESULTS & DISCUSSION):

Results:

Demography:

Among the 273 participants 76.2% (no=208) were female and 23.8% (no=65) were male.

Table 1 : Knowledge and awareness of handling Methyl methacrylate monomer

Questions pertaining to Methyl methacrylate (MMA)	Percentage of participants who gave the right response (n= 273)
Inflammable nature of MMA	89.8
Primary route of exposure (Inhalation)	55
Maximum threshold level in air (100 ppm)	48.3
Half-life of MMA in blood (10-15 hours)	52.01
Allergic nature of MMA	81.2
Neurotoxicity	7.3
Penetrates latex gloves	50.1
Storage method of MMA	64.4
Proper disposal method	37.3
Trimming of acrylic prosthesis releases monomer vapor	68.8
Presence of fire extinguisher in the lab	67.3
Presence of first aid kit in the lab	59.3
Presence of eye wash station	67.3

Knowledge on MMA (Table 1):

89.8% (no=245) of the study group were aware of its highly inflammable nature. 45% of them did not have any prior knowledge of its primary route of exposure. The accepted maximum threshold level for MMA is 100 ppm and 48.3% (no=132) of them were aware of the same. 52.01% (n=142) participants had prior knowledge of the half-life of MMA in blood which is about 10-15 hours.

81.2% (no=222) were aware of the allergic nature of

MMA however, 92.7% (no=253) were not aware of its neurotoxicity. Majority of the participants were aware of the proper storage methods which is in a tightly closed 64.4% (no=176) amber coloured bottle 60.4% (no=165). 37.3% (no=102) aware of proper disposal method which is atomizing in a combustion chamber. 68.8% of the participants knew that monomers vapours are released during trimming of acrylic prosthesis.

Awareness of the facilities in the laboratory (Table 1):

Dental labs have windows for ventilation, but about 46% (no=126) of the participants were aware of the same.

All the dental labs have emergency facilities in the form of Fire extinguisher, First aid kit and eye wash station. 67.3 (no=184) were aware of the presence of Fire extinguisher, 59.3 (no=162) were aware of the presence of First aid kit and 67.3 (no=184) aware of the eye wash station inside the lab.

Use of personal protective aids *(Table 2)*:

Safety goggles, Mask, Gloves and Laboratory coat are the protective aids that can be used while handling MMA. 62.6% of the total participants used safety goggles, 53.4% of them used gloves, 21.9% used lab coat and 29.6% used masks while handling MMA.

Among the personal protective equipment, 71% of them changed their gloves every day, 6.9 % once a week, 4.76% once a month and 15.3% changed it at a frequency other than the ones mentioned above. Masks were changed by 68.8% of the participants on a daily basis.

Table 2: Use of personal protective aids among dental students

Protective aids	Participants (%age)
Goggles	62.6
Gloves	53.4
Mouth masks	29.6
Lab coat	21.9

History of allergic reaction:

A small percentage of the participants (16.11%) experienced allergic reaction like irritation and skin rashes. None of the participants had experienced any systemic effect.

DISCUSSION

Methyl Methacrylate monomer is highly inflammable and has to be handled carefully. The laboratories where MMA is handled should be equipped with appropriate fire and safety measures. In the present study, majority of the participants were aware of the fact that MMA monomer is highly inflammable in nature. The dental students should be sensitized regarding the basic fire safety procedures such as operating a fire extinguisher. Emergency contact numbers should be displayed in the right area and fire evacuation drills should be regularly conducted in order to tackle a fire in laboratory.

Safety goggles, Mouth mask, Gloves and Laboratory coat are the basic protective aids that can be used while handling MMA[7]. Approximately half the students were using safety goggles and mouth mask, but only one fourth of them were using lab coat and latex gloves. Since the primary route of exposure of MMA is inhalation, followed by direct skin contact, dental students should be advised to wear mouth masks and Polyvinyl alcohol gloves or butyl rubber gloves while handling MMA. Latex gloves are not advisable for use as monomer can penetrate it. Allergic reaction such as irritation and skin rashes were experienced by a very small proportion of the participants of this study. The use of personal protective equipment can help avoid the occurrence of allergic reactions by protection from exposure.

MMA monomer should be stored in tightly closed amber colour bottles to avoid unwanted polymerization and three fourth of the subjects knew this fact [8]. Accepted maximum threshold level for MMA in air is 100 ppm[7] and thus is mandatory to have proper ventilation to reduce the level of MMA in the laboratory.

MMA can cause local effects such as skin rashes to severe systemic effect like neuro- toxicity. Thus, students should take measures to reduce the exposure to MMA by using personal protective aids and work in a well-ventilated setup. In this study majority of the participants were aware of the local allergic nature of MMA but not aware of its neurotoxicity.

In case of exposure to MMA the first aid procedures include the following:

If inhaled, move person into fresh air; In case of skin contact, wash off with soap and plenty of water. In case of eye contact, flush eyes with water as a precaution; If swallowed, Do NOT induce vomiting. Nothing should be administered orally to an unconscious person. Rinse mouth with water and consult a physician[9].

In case of spillage appropriate personal protective equipment should be used and the material that has spilt over should be absorbed onto sand or vermiculite; any source of ignition must be removed from the proximity of the spill. The absorbed material must be scooped and collected in a plastic bag which is further placed into another plastic bag for double protection later to be delivered to the next chemical waste pick-up. The disposal is by atomizing in a combustion chamber[8]. One third of the participants of this study were aware of the above-mentioned procedure.

Dental labs should be well ventilated with windows and exhaust fans, vacuum suction and fume hood. The dental labs must possess emergency facilities such as the fire extinguisher, first aid kit and running water supply. One third of the students using the dental laboratory were not aware of the same.

CONCLUSION

Most of the students were aware of the facilities available in their laboratory, protective equipment required while handling and proper storage method of MMA. However, dental students need to enhance their knowledge of Methyl Methacrylate (MMA) in terms of its route of exposure, local and systemic side effects and proper disposal methods so that any incident of spillage or exposure can be handled appropriately.

In an attempt to increase the awareness and enhance the knowledge of handling methyl methacrylate among the participants an interactive session was conducted. The session comprised of briefing the students about the properties of MMA pertaining to storage, its inflammable nature and first aid measures in case of spillage and exposure with emphasis on the use of personal protective equipment while handling MMA. A bookmark containing the highlights of the session was also distributed among the participants for future reference and reinforcement.

Conflict of Interest – None

Source of Funding- Self funded

Ethical Clearance – Ethical Clearance was obtained from the Institutional ethical committee

REFERENCES

1. Golbabaei F, Mamdouh M, Nouri Jelyani K, Shahtaheri S. Exposure to Methyl Methacrylate and its Subjective SymptomsAmong Dental Technicians,Tehran-Iran. Iran Occup Heal [Internet]. 2006;3(2):6. Available from: http://ioh.iums.ac.ir/article-1-476-en.html
2. Wittczak T, Pałczyński C, Szulc B, Górski P. [Bronchial asthma with inflammation of the nose mucous membrane induced by occupational exposure to methyl methacrylate in a dental technician]. Med Pr [Internet]. 1996;47(3):259—266. Available from: http://europepmc.org/abstract/MED/8760510
3. Hafez KA. Assessing the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV): lifting beyond 30 degrees torso asymmetry. 2016.
4. OHSAH. Using the American Conference of Industrial Hygienists (ACGIH) Threshold Limit Values ® (TLVs ®) in the Regulation of Workplace Chemicals and Substances in British Columbia : A Scientific Analysis Highlighting Issues to Consider. 2003. 43 p.
5. Anna Maria, Rajaniemi R. Local neurotoxicity of methyl methacrylate among dental technicians. Am J Ind Med. 1984;5(6):471–7.
6. Lozewicz S, Davison AG, Hopkirk A, Boldy PS, Riordan JF, McGivern D V, et al. Occupational asthma due. Thorax. 1985;40(11):836–9.
7. Parizi JLS, Nai GA, Batalha CF, Lopes CCB, Rizzo MF, Falcone CE, et al. Assessment of methyl methacrylate vapor toxicity on the rat tracheal epithelium. Braz Oral Res. 2005;19(3):223–7.
8. Prof. Susannah Scott. Standard Operating Procedure. 2008.
9. Helmut Greim. The MAK-Collection for Occupational Health and Safety: Part I: MAK Value Documentations,. 2011;26:229–53. Available from: https:// www.wiley.com/en us/he+MAK+ Collection+for+ Occupational+Health+and+ Safety %3A+Part+I%3A+MAK+Value+ Documentations %2 C+ Volume+26-p- 9783527323067

A Study on Effects of Serum Calcium Levels in Relation to Ankle Joint Instability - A Case Control Study

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ABSTRACT

1/4th of what we eat keeps us healthy and 3/4th of what we eat , keeps the doctors wealthy is the recent highlighted quote. With developing lifestyles and its proportionate increase in stress levels leads to so many diseases. This study is focussed on the serum calcium levels as a risk factor in individuals who have recurrent ankle sprains. The serum calcium levels of 80 individuals (Male - 47, female 33) who had recurrent ankle sprains were taken as Cases and 80 volunteers were taken as the control group (1:1)who were age and sex matched with that of the cases. Chi square value was found to be 5.48 ($P < 0.05$) which means there was an association between serum calcium level and ankle joint instability and odds Ratio value was found to be 2.22 (95 % C.I:1.07-4.60). This interpretation concludes that there is a higher likelihood of ankle joint instability associated with serum calcium deficiency. Among the 80 subjects of group I , 34 had low serum calcium levels and they were put into a follow up study and the values of the serum calcium levels were measured again. On comparison of Serum calcium mean levels in the pretest and post test among 34 patients, The mean level in the pretest was 7.59 mg/dl as compared to 8.95 in the post test. The difference in the mean levels (1.36) was statistically significant ($P<0.001$) ,and the recurrence rate of ankle sprain also reduced.

Keywords *: Serum calcium levels, Joint instability, calcium supplements.*

INTRODUCTION

Calcium accounts for 1 to 2 percent of adult human body weight. Over 99 percent of total body calcium is found in teeth and bones. With aging, fractional absorption gradually declines. Research has shown that adequate calcium intake can reduce the risk of fractures, osteoporosis, and diabetes in some populations. Dietary requirements for Ca are determined by the needs for bone development and maintenance, which vary throughout the life stage, with greater needs during the periods of rapid growth in childhood and adolescence, during pregnancy and lactation, and in later life[17.] Calcium (Ca2+) release from intracellular stores controls numerous cellular processes, including cardiac and skeletal muscle contraction, synaptic transmission and metabolism [18]. Many studies have shown that an increased phosphorus (P) intake may have negative effects on the skeleton, whereas calcium (Ca) intake may have a protective effect on it. As there may be an optimal balance between the 2 in relation to bone health, interest has been focused on the dietary Ca:P ratio(Virpi Kemi May 2017) Thyroid gland with its parafollicular cells secreting calcitonin has an effect over calcium metabolism.Calcitonin is involved in helping to regulate levels of calcium and phosphate in the blood, opposing the action of parathyroid hormone. This means that it acts to reduce calcium levels in the blood.Thyroid hormones profoundly alters bone turnover by a direct action on the bone cells and by influencing calcium compartment sizes as well as flow to and from these compartments. Considering all the above factors, we can see that,the word sprain/joint instability is not a MERE word these days , but has a complexed meaning of all the above said

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factors or much more influencing its occurrence and recurrence.

Aim : The aim of this present study is to find the effects of serum calcium levels on ankle joint instability

Objective : The serum calcium levels of the individuals who have recurrent ankle sprains are measured and interpreted to check if there is any significant role of calcium in determining the bone stability.

Hypothesis:

- Low serum calcium levels have considerable effect on bone instability

- Low serum calcium levels can affect bone strength and can cause recurrent ankle sprains

- Normal serum calcium levels can considerably help in reducing the chances and frequency of recurrence of ankle sprains.

MATERIALS AND METHOD

A designed prospective study was done at the Nathan Super speciality hospital , Salem, Tamilnadu , India. With the estimated odds ratio, a total of 160 patients were selected (March 2017- May 2018)by random sampling technique. They were divided into two groups. Group I who visited the hospital with the history recurrent ankle sprains (minimum 2sprains/month), group II who did not have ankle sprains, but visited the hospital for other complaints. The individuals were explained the importance of the study , the importance of calcium levels and all the potential risk factors were explained to them. The entire study was explained to the individuals in the local language. Approximately 2ml of blood sample was obtained after getting the consent form duly signed by the individuals of both the groups. The individuals of both the groups were age and sex matched.

Inclusion criteria :Group I

Patients with recurrent ankle sprain

Age group between 25-45 years

Exclusion criteria (For both the Groups)

Pregnant women

Any congenital diseases influencing the thyroid levels

Any surgery involving the lower extremities

Individuals who are already in thyroid and calcium supplements

Any metal implants

Any fracture in the lower extremities.

who are not willing to be a participant

Limitations of the study:

Limited only to patients with recurrent ankle sprain, and age group of 25-35 years.

RESULTS

The normal human serum calcium level is found to be in the range of 8.2-10.5mg/dl [1,2] The results were tabulated for each group and the statistical analysis was done with the help of SPSS software.

Table I- The mean values, standard deviation, minimum and maximum values of serum calcium levels of Male and Female subjects of group I

Serum calcium levels (8.2-10.5mg/dl)	Normal	Minimum	Maximum	Mean	Std. Deviation
Male	47	7	13	9.67	1.563
Female	33	7	11	8.33	1.217

Table II- The mean values, standard deviation, minimum and maximum values of serum calcium levels of Male and Female subjects of group II

Control - Group II					
Serum calcium levels	**N**	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
Male	47	6.6	12.0	9.238	1.1528
Female	33	6.6	12.1	9.109	1.2360

Table III- Showing association between Serum calcium level and ankle joint instability

Serum calcium deficiency	**Ankle joint instability**		**Total**
	Yes	**No**	
Yes	34	20	54
No	46	60	106
Total	80	80	160

Chi square results were found to be 5.48 (P <0.05) and Odds Ratio was found to be 2.22 (95 % C.I:1.07-4.60) at 95% confidence interval.

In group I, 34 subjects had low serum calcium levels. With informed consent, the needed calcium supplements were given to them. A follow up study was done for a period of three months and again the blood samples were collected and checked for the serum calcium levels. The results were tabulated as below.

Table IV Comparison of Serum calcium levels among the patients before and after the medication

Variables	**Test**	**Mean**	**SE**	**Mean difference**	**SE (Mean difference)**	**Paired 't'**	**P value**
Serum calcium	Pre test	7.59	0.08	1.36	0.12	11.06	<0.001
	Post test	8.95	0.07				

DISCUSSION

Calcium is an important component of the skeletal mass of the human body, seen almost 99% in bones and 1% in the teeth. Calcium constitutes of 1% of total body weight. It is also an essential nutrient required for nerve conduction, muscle contraction, hormone and enzyme secretion, and blood clotting. Adequate calcium intake is essential for normal growth and development of the skeleton and teeth and for adequate bone mineralization[14,15]. The values of serum calcium level may vary with various parameters like socioeconomic status[3] , gender differences[9], hormonal factors etc. In adulthood, low calcium intake has been associated with increased risk for osteoporosis ,bone fractures, and falls[6.7.8]

The risk of spraining an ankle depends on both intrinsic factors (hind foot alignment, ligament laxity, muscular force, neuromuscular control and so on) and extrinsic factors (shoes worn, type and intensity of sport, warm up and so on). [12,13]

Coming to the group II , 14 of the subjects had low serum calcium levels, but did not show any signs of ankle joint instability. These subjects in group II may

also fall under the risk of joint instability. The values of Chi square= 5.48 (P <0.05) means that there is an association between serum calcium level and ankle joint instability. Odds Ratio =2.22 (95 % C.I:1.07-4.60). This interpretation shows a higher likelihood of ankle joint instability significantly associated with serum calcium deficiency.

There have been numerous trials and meta-analyses of calcium supplementation for fracture reduction, and associations with risk of myocardial infarction have been suggested in recent years[10]. In the current study, among 80 subjects of group I , 34 subjects showed low calcium levels. They were put into a follow up study for three months with needed changes in lifestyle, calcium supplements. After a period of three months , blood sample was taken again for the 34 individuals and tested for the serum calcium levels. The mean serum calcium level in the pretest was 7.59 mg/dl as compared to 8.95mg/dl in the post test. The difference in the mean levels (1.36) was statistically significant (P<0.001). There was a significant increase in the level of serum calcium and this showed that the intervention was effective. Also the frequency of spraining the ankle was reduced among the subjects.

CONCLUSION

The ankle joint also forms the main weight bearing area of the body next to the knee joint.It needs lots of factors to stabilize its proper functioning [13]. The current study shows calcium as one of the potential risk factor in recurrence of ankle sprain/ ankle instability. It also shows that there is significant increase in serum calcium levels post medication and decrease in the frequency of ankle sprains. Calcium ,vitamin D are important mutual factors in strengthening the skeletal mass[11,16]. Calcium with its role in muscular control, when checked for its normal levels periodically , can help in avoiding risk of spraining a muscle, stabilisation of joint compartment and also in muscle strengthening. Orthopaedicians should have a vision on these parameters along with other treatment procedures.

Conflict of Interest - There was no conflict of interest during the period of study

Source of Funding - None - declared

Informed Consent Form - The research was conducted after obtaining informed consent form for the respective subjects who took part in the research (both for group I and group II)

Ethical Clearance : Declared clear and approved by the Research Department , Saveetha University (Feb 2017)

REFERENCES

1. Peacock M. Calcium metabolism in health and diseases. Clin J Am Soc Nephrol. (Suppl 1)May 2010:S23–30.
2. Sunita M Aghade, Pushpa S Rajan, Assessment of serum calcium level in obesity in Indian population, MedPulse International Journal of Biochemistry, Volume 4, Issue 2, November 2017 pg 36-39
3. Kim Y. Food and nutrient consumption patterns of Korean adults by socioeconomic status. Korean J Community Nutr. Volume 6,2001; Pg 645–656.
4. Al-Rahawi, D intake of Calcium and Vitamin D and its Relationship to Bone Health: incidence and prevalence of osteoporosis. Thesis submitted for Master of Science degree, University of Cincinnati, Ohio.2008
5. Tylavsky, F.A., L.A. Spence and L. Harkness, The Importance of Calcium, Potassium and Acid-Base Homeostasis in Bone Health and Osteoporosis Prevention. J. Nutr., 2008, 138: pg 164S-165S.
6. NIH Consensus Development Panel on Osteoporosis Prevention, Diagnosis, and Therapy, highlights of the conference. South Med J. March 2001; Volume 94:Pg 569–73.
7. Dawson-Hughes B. Calcium insufficiency and fracture risk. Osteoporos Int. 1996;6 Suppl 3:37–41.
8. Bischoff-Ferrari HA, Rees JR, Grau MV, Barry E, Gui J, Baron JA. Effect of calcium supplementation on fracture risk: a double-blind randomized controlled trial. Am J Clin Nutr. Volume 87, 2008 ,Pg1945–51.
9. Jorde R1, Sundsfjord J, Bønaa KH.Determinants of serum calcium in men and women. The Tromsø Study.Eur J Epidemiol. Volume 17, issue 12, 2001: pg 1117-23.
10. Nicholas C Harvey et al,The role of calcium supplementation in healthy musculoskeletal ageing Osteoporosis International, Volume 28, Issue 2, February 2017, pg 447–462

11. Gehlert S, Bloch W, Suhr F (2015) Ca2+-dependent regulations and signaling in skeletal muscle: from electro-mechanical coupling to adaptation. Int J Mol Sci Volume 16, 2015, Pg 1066–1095
12. Arno Frigg, Olaf Magerkurth, Victor Valderrabano, Hans-Peter Ledermann Chronic lateral ankle instability Br J Sports Med. volume 41, issue 7, July 2007: pg 420–424.
13. Baumhauer J F, Alosa D M, Renstroem P A. A prospective study of ankle injury risk factors. Am J Sports Med 1995. Pg 23564–570.
14. Anderson JJB, Roggenkamp KJ, Suchindran CM. Calcium intakes and femoral and lumbar bone density of elderly U.S. men and women: national health and nutrition examination survey 2005–2006 analysis. J Clin Endocrinol Metab volume 97, 2012, pg 4531–9.
15. Aptel I, Cance-Rouzaud A, Grandjean H. Association between calcium ingested from drinking water and femoral bone density in elderly women: evidence from the EPIDOS cohort. J Bone Miner Res Volume 14, 1999 , pg 829–33.
16. Kroger H, Tuppurainen M, Honkanen R et al. Bone mineral density and risk factors for osteoporosis – a population-based study of 1600 perimenopausal women. Calci Tissue Int Volume 55, 1995 : pg 1–7.
17. Flynn A,The role of dietary calcium in bone health. Proc Nutr Soc. volume 4, issue 62 , 2003:pg 851-8.
18. Santulli G, Marks AR Essential roles of intracellular calcium release channels in muscle, brain, metabolism, and aging. Curr Mol Pharmacol, 2015 in press.

Impact of Service Quality on Customer Satisfaction Special Reference to Retail Outlets in Tamil Nadu

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ABSTRACT

Retail store profitability is dependent on the conversion rate of footfalls. One of the critical aspects that consumers use to make a buy, or no buy decision is the service quality offered by the store they choose to visit. This research provides insight into relationship between demographics of consumers, specifically age group, gender, marital status, and income group. The findings of the research suggest that the top priority of consumers seems to be: Loyalty Cards, Equipment/Fixtures, Timely Home Delivery, Merchandise quality, Packaging/ labeling, Error free transactions, and Error free home delivery. Further reliability and Policy have a greater impact on consumer satisfaction. Gender and Age do not seem to impact perceived or expected quality of services at retail outlets

Keywords: *service quality, SERVQUAL, RSQS, Retail, hierarchical measurement, expectation, perception*

INTRODUCTION

Retailing in India has metamorphosed from an industry dominated by traditional stores to an industry that now has a mix of traditional and modern format stores. Consumers choose among these different types based on the kind of purchases, namely durables, non-durables, and white goods. They also discriminate among the stores based on purchase volume and total spend. Consumer expectations of service quality differ between traditional and modern formats, for example consumers do not expect electronic modes of payment when they visit a traditional store, whereas they expect electronic payment facility when they shop at modern stores. Similarly, consumers to do not expect ambience in a traditional store but when they visit a modern format store they do expect the ambience to be good (Air conditioning for example). Given this differences in expectations service quality becomes an important aspect of modern retail outlets.

Modern retailing has expanded quickly in the last two decades and competition has intensified in industry. It has been reported in the newspapers and magazines that modern retailers are running huge debts in order to keep themselves afloat. Many retail giants have expressed that the cost of operations is big chunk of their total cost. Operations cost includes supply chain management cost, real estate cost, and human resources cost. All these have direct linkage with the four major elements of service quality, namely, tangibles, reliability, responsiveness, and store policies. These four elements can be further divided into 18 measurement items as shown in the table below:

Table 1 : Service Quality Measurement Items

S. No.	RSQ Dimension	RSQ sub Dimension	Perception item
1	Physical aspects	Appearance	P1: This store has modern looking equipment and fixtures
2	Physical aspects	Appearance	P2: The physical facilities at this store are visually appealing

Cont... **Table 1 : Service Quality Measurement Items**

3	Physical aspects	Appearance	P3: Materials associated with this store's service are visually appealing
4	Physical aspects	Appearance	P4: This store has clean, attractive, and convenient public areas
5	Physical aspects	Convenience	P5: The layout at this store makes it easy for customers to find what they need
6	Physical aspects	Convenience	P6: The Layout at this store makes easy for customers to move around in the store
7	Reliability	Promises	P7: When this store promises to do something by a certain time it will do so
8	Reliability	Promises	P8: This store provides services at the time it promises to do so
9	Reliability	Doing it right	P9: This store performs the service right the first time
10	Reliability	Doing it right	P10: In this store merchandize are available when the customer wants it
11	Reliability	Doing it right	P11: This store insists on error free sales transaction and records
12	personal interaction	Inspiring confidence	P12: Employees in this store have the knowledge to answer customers questions
13	personal interaction	Inspiring confidence	P13: The behavior of employees in this store instills confidence in customers
14	personal interaction	Inspiring confidence	P14: Customers feel safe in their transaction with this store
15	personal interaction	Courteous/helpfulness	P15: Employees in this store give prompt service to customers
16	personal interaction	Courteous/helpfulness	P16: Employees in this store tell customers when exactly services will be performed
17	personal interaction	Courteous/helpfulness	P17: Employees in this store are never too busy to respond to customer's request
18	personal interaction	Courteous/helpfulness	P18: This store gives customer individual attention

Source: Researcher's Compilation

Given this linkage to the operations costs, it is pertinent that retailers focus on these in order to extract maximum mileage for their investment. This translates into providing superior service quality. Excelling on all the areas of service quality could be a vision but seldom achievable. Hence the best option for retailers is to match the expectation of the consumers in the areas of service quality that matter most to them. Differently said retailers need to identify service quality aspects that consumers use to differentiate between stores. In order to facilitate this process this research attempts to identify the store attributes that are used by consumers to choose shops for fulfilling their wants.

Literature

Economic activities performed to fulfil needs of one party to another are called services. Commonly services are time bound and result in satisfying some needs of the recipients. Services comprise financial

exchange, expense of resources such as time, and effort. Customers' expectations from service providers include value from goods, labor, specialized skills, amenities, networks, and arrangements. While service encounters result in fulfilment of customer expectation but do not involve change of ownership of physical components involved. The essential feature of services is the ubiquity of intangible elements and the absence of ownership exchange.

Services quality is measured as a gap between customers' expectation and what is actually provided by the services provider. Services are an essential component of many businesses and retail business is no exception. services play a major role in retail ecosystem towards customer satisfaction and loyalty. While quality of goods can be measured easily based on the performance of the goods and their attributes, the same is not true for services due its intangible nature. Further, the fact that expectations vary from one customer to another, the situation becomes even more complex. In view of the supremacy of intangible components, services quality measurement includes subjective and objective methods. Hence service quality measurement is an indirect measurement of customer satisfaction. Subjective methods of measuring service quality are critical incident method, SERVQUAL, and Relevance method. SERVEQUAL or a modified version of it is most widespread method used by researchers. Objective elements of service quality can be divided into primary processes and secondary processes. In the primary process, service encounters of customers are observed. In the secondary, countable factors such as numbers of customer complaints or numbers of goods returned are evaluated to make inferences about service quality.

Numerous models have been developed to measure customer perception of service quality. Most of these models employ direct interaction between customers and the personnel of the service providers. As per Lewis and Booms[1] (1993) "service quality is a measure of how well the service delivered matches customer expectations". Conceptually service quality is defined as the over-all conclusion or outlook relating to the excellence or superiority of the service[2] (Parasuram et al., 1988). It encompasses the evaluation of customer expectation against customer perception of actual service performance[3] (Parasuram et al., 1985, 1988). They have developed a measurable scale termed SERVQUAL, in which, five dimensions namely – Tangibles, Reliability, responsiveness, Assurance, and Empathy. The SERVQUAL instrument has been widely recognized and applied to various service settings such as health care, large retail chains, banks and restaurants. However, the generalizability of the dimensions of SERVQUAL across different service industries has been questioned. Further, the two-battery tool to measure expectation and perception has been viewed as inapt in terms of scale reliability and questionnaire length[4] (Carman, 1990). Although SERVQUAL has been empirically tested in a number of studies involving pure service such as banking, credit card service, etc. it has not been successfully adapted to and validated in a retail store environment[5] (Dabholkar et al., 1996) they reason that a measure of retail service quality must capture additional dimensions. As a result of numerous focus groups experiments, they have developed the RSQS (Retail Service Quality Scale) that includes the 4 dimensions namely – Physical Aspects; Reliability; Personal Interaction; problem solving; and Policy. They believe that their scale is able to serve as a analytic tool for retailers to determine which service areas need improvement so that store managers can deploy resources for improving those specific features of service quality.

Service quality has been found to be an important predictor of consumer behavior such as repeat purchase intentions, likelihood of recommendation, switching, and complaing[6] (Bittner, 1990). Woodside et al., 1989 Significant association between service quality and repeat purchase behavior has been observed[5]. Dabholkar et al. (1996) similarly significant relationship between service quality and the likelihood of recommending and repeat purchase has also been observed[5]. Therefore, the objective of the study is to study the impact of service quality on customer satisfaction for retail shop customers in Tamil Nadu. The following are the sub-objectives of the study:

To find if customer satisfaction is independent of gender

To find if the customer satisfaction is independent of Age group to which the respondents belong

To find out the elements of retail service quality that are most relevant to the cusom

Though there is a absence of harmony on the service quality measurement concept, academicians do agree to it being multidimensional in nature and

involvement of higher order ideas[7, 5, 4, 3, 8] (Brad and Cronin, 2001; Dabholkar et al., 1996; Carman, 1990; Parashuraman et al., 1988; Gronroos, 1984). Brady and Cronin's (2001). Findings of research on service quality suggest that customers' perceptions are a multidimensional hierarchical construct consisting of customers' overall perception of service quality, the primary dimension and the sub-dimensions. The sub dimensions are considered as first order factors of service quality construct and the primary dimensions are considered as second order factors of the service quality construct. The hierarchical approach has been adopted by many marketing academics for measuring the service quality in various service contexts such as agribusiness[9] (Gunderson, Gray, and Akridge, 2009), airport[10] services (Fodness and Murray, 2007), education[11] (Clemes, Gan, and Kao, 2007), electronic services[12] (Fassnacht and Koese, 2006). However, no study could be found in the literature which construes service quality in retail outlets as a hierarchical construct.

Retail Service Quality Scale (RSQS)

The retail Service Quality scale was developed by Pratibha A. Dabholkar, Dayle I. Thorpe, Joseph O. Rentz in 1996 to measure the services provided by retail outlets. The RSQS25 uses a hierarchical structure to evince customers' perceptions as well as expectations. This allows the determination of gap between the two and hence the need for improvement can be assessed. Additionally, the scale is divided into primary and secondary and sub-dimensions. The scale can be used either to study only the secondary and sub-dimension or can be used to study the overall measurement of service quality. The RSQS has the following dimension and sub-dimensions in an hierarchical fashion:

1. Physical Aspects
2. Appearance
3. Convenience
4. Reliability
5. Promises
6. Doing it right
7. Personal Interaction
8. Inspiring confidence
9. Courteous/helpful
10. Policy

Physical aspects – includes functional elements like layout, comfort and privacy and also aesthetic elements such as the architecture, color, materials and style of the store.

Reliability – a combination of keeping promises and performing services right.

Personal interaction – the service personnel being courteous, helpful, inspiring confidence and trust in customers.

Problem-solving – the handling of returns and exchanges as well as complaints.

General Policy – a set of strategies, procedures and guiding principles which the store operates

METHODOLOGY

Mall encounter method was used to run the survey using RSQS along with some demographic variables. The sample size was 750 customers who visited and completed their shopping in a modern format retail store. SPSS package was used to run a correlation analysis to discern if there are any relationship between demographics, store attributes and customer satisfaction. The results indicate a strong correlation between tangible aspects of store and customer satisfaction. It seems that tangible attributes of stores are of paramount importance to customer while choosing a store.

Exploratory factor analysis was run on the gap between expectation and perception averages along with demographics, which resulted in the extraction of 4 components consisting of Age and Marital Status as first component, Income and Average Score of Tangibles as second component, Store policy and Reliability as third component, Gender and Responsiveness as fourth component.

Further a categorical regression was run to estimate an equation relating the RSQS elements, demographics and customer satisfaction. All variables except marital status were found to be significant at an alpha of 0.05

RESULTS AND DISCUSSION

Since the variables in RSQS are measured on a 5point scale a categorical regression was deemed appropriate. The relevant tables from SPSS output are given below. The regression is highly significant with an R square of 0.65 indicating sufficiently high predictive power.

Table 2: Regression Coefficients for Customer Satisfaction Vs Gaps and Demographics

RSQS Elements	Standardized Coefficients	df	F	Sig.
Equipment/Fixtures	0.231	4	16.413	0
Layout	0.141	4	7.55	0
Aisle space	0.109	4	3.636	0.007
Packaging/ labeling	0.181	4	11.283	0
Ambience	0.112	4	3.16	0.015
Merchandise quality	0.183	4	10.71	0
Parking Space	0.136	4	6.382	0
Billing time	0.165	3	11.236	0
Error free transactions	0.18	2	12.206	0
Merchandise availability	0.159	3	11.644	0
Timely Home Delivery	0.218	3	16.128	0
Error free home delivery	0.179	3	12.235	0
Returns/ Exchanges	0.116	1	5.458	0.02
Complaint Handling	0.116	3	4.904	0.003
Operating hours	0.096	2	3.111	0.047
Accepts CC/DC	0.121	2	5.854	0.003
Loyalty Cards	0.24	3	18.657	0
Source: Researcher's Computations Dependent Variable: overall satisfaction				

Since all the coefficients are positive and significant it is clear that an increase in the perception about RSQS elements leads to greater customer satisfaction. The top priority of consumers seems to be: Loyalty Cards, Equipment/Fixtures, Timely Home Delivery, Merchandise quality, Packaging/ labeling, Error free transactions, and Error free home delivery

The Categorical regression output for gaps between Expectation and Perception reveals that all the coefficients are negative indicating that an increase in gap leads to decrease in customer satisfaction. From the coefficients table it is observed that the regression coefficients for all the variables except Gender and Age are significant. Further reliability and Policy seem to have a greater impact on consumer satisfaction. Since Gender and Age are not significant it can be construed that consumer satisfaction is independent of gender and age as far as service quality is concerned.

Table 3: ANOVA for Customer Satisfaction Vs Gaps and Demographics

	Sum of Squares	df	Mean Square	F	Sig.
Regression	63.073	14	4.505	5.664	0
Residual	186.927	235	0.795		
Total	250	249			
Source: Researcher's Computations Dependent Variable: Customer satisfaction string					
Predictors: Gender Age Marital Status Tangibles reliability personal interaction policy					

Table 4: Regression Coefficients for Customer Satisfaction Vs Gaps and Demographics				
Variables	**Standardized Coefficients**	**df**	**F**	**Sig.**
Gender	0.069	1	1.898	0.17
Age	0.063	3	1.794	0.149
Marital status	0.128	1	4.087	0.044
Tangibles	-0.208	2	4.255	0.015
reliability	-0.223	3	18.696	0
personal interaction	-0.174	2	3.872	0.022
policy	-0.243	2	24.099	0
Source: Researcher's Computations Dependent Variable: Customer satisfaction string				

CONCLUSION

The research findings confirm that services at retail outlets are important in general and specifically Physical aspects of the store along with, Timely Home Delivery, Merchandise quality, Packaging/ labeling, and Error free transactions are important for the consumers and they seem to use these for making a selection of stores for their purchases. Further reliability and Policy have a greater impact on consumer satisfaction. In view of this it is suggested that retailers focus on creating an environment inside the store that will provide a satisfying experience for the consumers. Retailers should not focus on a few aspects of service delivery, they should manage the total shopping experience of consumers.

Ethical Clearance- Not applicable

Source of Funding- Self

Conflict of Interest: Nil

REFERENCES

1. Lewis, R.C. & Booms, B.H. (1983), "The marketing aspects of service quality" in Berry, L., Shostack, G. and Upah, G. (eds.), Emerging perspectives on services marketing, American Marketing Association Chicago, pp. 99-104.
2. Parasuraman, A., Zeithaml, V. A. & Berry, L. L. (1988), "SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality", Journal of Retailing, 64(1), pp. 12-40.
3. Parasuraman, A., Zeithaml, V. A. & Berry, L. L. (1985), "A conceptual model of service quality and its implications for future research", Journal of Marketing, 49(4), pp. 41-50.
4. Carman, J.M. (1990), "Consumer perceptions of service quality: an assessment of the SERVQUAL dimensions", Journal of Retailing, Vol. 66 No. 1, Spring, pp. 33-5.Dbholkar
5. Bitner, M. (1990). Evaluating Service Encounters: The Effects of Physical Surroundings and Employee Responses. Journal Of Marketing, 54(2), 69-82
6. Grönroos, C. (1984). A service quality model and its marketing implications. *European Journal of Marketing*, 18(4), 36–44.
7. Brad, M. K; Cronin, J. J. "Some New Thoughts on conceptualizing Perceived Service Quality: Hierarchical approach" Journal of Marketing, Vol. 65, July , 2001, PP 34 – 39
8. Gunderson, M. A., Gray, A. W. and Akridge, J. T. (2009), Service quality in agronomic inputs: does the hierarchical model apply?. Agribusiness, 25: 500-519.
9. Fodness, D., & Murray, B. (2007). Passengers' expectations of airport service quality. Journal of Services Marketing, 21(7), 492 – 506.
10. Michael D. Clemes, Christopher E.C. Gan & Tzu-Hui Kao (2008) University Student Satisfaction: An Empirical Analysis, Journal of Marketing for Higher Education, 17:2, 292-325,DOI: 10.1080/08841240801912831
11. Fassnacht, M.,and Koese, I. (2006). Quality of electronic services: conceptualizing and testing a hierarchical model. Journal of Service Research, 9(1), 19-37

In Vitro Evaluation of the Cytotoxicity of Chlorhexidine Digluconate, Povidone Iodine and Phenolic Compound Mouth Washes on Chinese Hamster V79 Cell Lines

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ABSTRACT

Aim: To assess and compare the cytotoxic potential of Chlorhexidine, Listerine and Povidone –Iodine antimicrobial agents on Chinese hamster lung fibroblast V79 cells.

Materials and Method: Chlorhexidine (0.2%), Listerine, Povidone iodine were diluted with DMEM medium under sterile conditions to obtain the required concentration. V79 cells were used for the experimental procedures. The cells were cultured in DMEM media supplemented with 10% FBS and 1% Gentamycin at 37^{0}C in a humidified 5% CO2 incubator. For all the assays, cells were maintained at 80-90% confluency in T-25 cm2 flasks and used as per requirement. V79 cells were seeded onto 96 well plates at a density of 104 cells per well and allowed to incubate overnight at 37 ^{0}C in 5% CO_2incubator. The following day the cells were treated with different concentrations of Betadine, Hexidine and Listerine for 12, 24 and 48 hours. Following the treatments, the drug containing media was discarded and 100µl of freshly prepared MTT stock prepared in DMEM media was added in to each well and the plates were incubated at 37^{0}C in 5% CO_2 incubator for 4 hours. Viability was determined by the ability of the cells to reduce MTT, a water soluble tetrazolium dye to produce violet crystals of formazan. Formazan crystals formed were solubilized by the addition of 100µl of (Di Methyl Sulfoxide). Optical density which is directly proportional to cell viability, was measured at 540nm using a multi well spectrophotometer. Viability curves were plotted using origin.

Percentage cell viability was obtained using the formula given below:

Percentage viability= [(OD Test – OD Blank)/ (OD Control – OD Blank)] *100

Results: V79 cells treated with serially diluted test compounds showed a decrease in cellular viability in a concentration as well as time dependent manner. Hexidine exhibited maximum toxic effect when compared to Listerine and Betadine; betadine possessing the least toxic nature as obvious by the IC_{50} values for different time durations.

Conclusion: Chlorhexidine was found to be most toxic when compared to Listerine and Povidone iodine. Povidone iodine being the least toxic amongst the three mouth rinse. All the compounds exhibited toxic effect in a dose dependent as well as time dependent manner. The result of this study showed that all three given mouth rinses caused V79 proliferation inhibition.

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INTRODUCTION

Good oral hygiene is said to be the mirror of individual's systemic health. Maintaining good oral hygiene plays an important role in the overall systemic health and wellness of an individual. Delibiliating systemic health conditions may lead to poor oral hygiene

with the associated periodontal breakdown. The oral health maintenance can be achieved by chemical and mechanical methods[1]. Medicated mouth rinses offer a simple, easy and effective solution for maintenance of oral hygiene in patients whose ability to do so otherwise is compromised. Mouthwashes are commonly incorporated for oral hygiene maintenance because of their capability to inhibit dental plaque. Plaque forms initially with the accumulation of Gram positive streptococci, and continues with the deposition of gram-negative microorganisms[2].

Mouthwashes contain various active agents in their chemical structure that help inhibit the accumulation, growth and the enzymatic reactions of the microorganisms to help reduce their levels in the mouth[3]. A lot of research has been conducted documenting the ability of the mouthwashes in inhibiting biofilms[4].

The aim of this study was to assess and compare the cytotoxic potential of three commonly used antiseptic mouth rinses on Chinese hamster lung fibroblast V79 cells.

MATERIALS AND METHOD

Chlorhexidine (0.2%), Listerine, Povidone Iodine were diluted with DMEM medium under sterile conditions to obtain the required concentrations. V79 cells were used for the experimental procedures. The cells were cultured in DMEM media supplemented with 10%FBS and 1% Gentamycin at 37^0C in a humidified 5% CO_2 incubator. For all the assays cells were maintained at 80-90% confluency in T-25 cm2 flasks and used as per requirement. V79 cells were seeded on to 96 well plates at a density of 104 cells per well and allowed to incubate overnight at 37^0C in 5% CO_2 incubator. Next day the cells were treated with different concentrations of Betadine, Hexidine and Listerine for 12, 24 and 48 hours. Following the treatments, the drug containing media was discarded and 100µl of freshly prepared MTT stock prepared in DMEM media was added in to each well and the plates were incubated at 37^0C in 5% CO_2 incubator for 4 hours. Viability was determined by the ability of the cells to reduce MTT, a water soluble tetrazolium dye to produce violet crystals of Formazan. Formazan crystals formed were solubilized by the addition of 100µl of DMSO. Optical density which is directly proportional to cell viability, was measured at 540nm using a multi well spectrophotometer. Viability curves were plotted using origin 8.

Percentage cell viability was obtained using the formula given below:

Percentage viability= [(OD Test – OD Blank)/ (OD Control – OD Blank)] *100

RESULTS

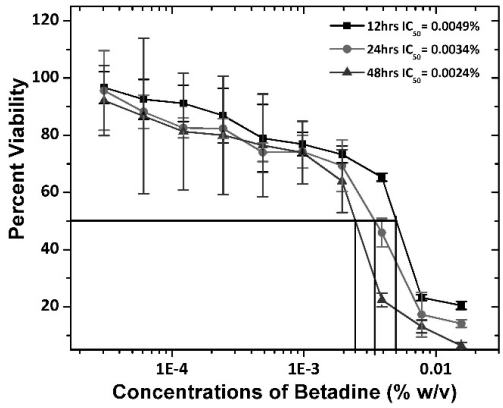
Graphs showing the response of V79 cells treated with different concentration of betadine (**A**), hexidine (**B**) and Listerine (**C**) for **12**, **24** and **48** hours. **X**-axis represents **log** concentrations of test compounds and the **Y**-axis represents the % viability respectively. The present study was designed to evaluate the cytotoxicity of three different compounds namely betadine, hexidine and Listerine which are commonly used as oral mouth washes. A comparative analysis on the cell viability has been represented in Graph1,2&3. V79 cells treated with serially diluted test compounds showed a decrease in cellular viability in a concentration as well as time dependent manner. Hexidine exhibited maximum toxic effect when compared to Listerine and betadine; betadine possessing the least toxic nature as obvious by the IC_{50} values for different time durations.

Test compounds	**Inhibitory concentration (IC_{50}) values (in %w/v)**		
	12 hours	24 hours	48 hours
Betadine	$49x10^{-4}$	$34x10^{-4}$	$24x10^{-4}$
Hexidine	$9.2x10^{-4}$	$4.1x10^{-4}$	$1.9x10^{-4}$
Listerine	$28x10^{-4}$	$26 x10^{-4}$	$23x10^{-4}$

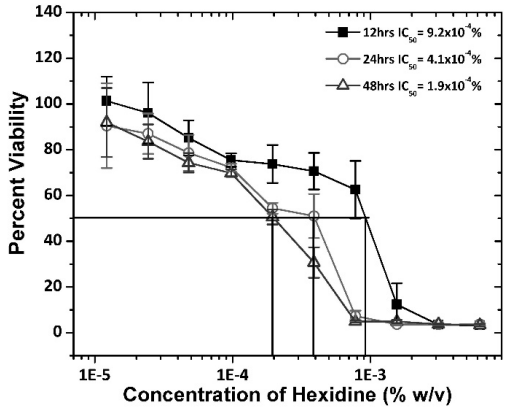
Table:1 Showing the IC_{50} values of betadine, hexidine and Listerine in terms of %w/v.

Also, from the IC_{50} values represented in table 1, it clearly indicates that hexidine exhibited maximum toxicity when compared to Listerine and betadine; betadine possessing the least toxic effect when compared to the other two compounds when compared for all the time durations.

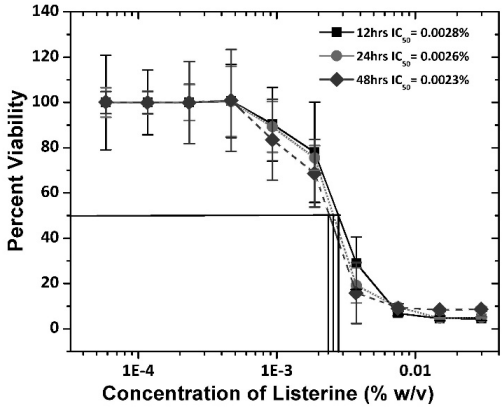
Thus, from the study the above experiment it was clearly observed that Betadine was safest when compared to Listerine and hexidine.



Graph 1: Effect of different concentrations of Betadine on the viability of the V79 cells



Graph 2: Effect of different concentrations of Hexidine on the viability of the V79 cells



Graph 3: Effect of different concentrations of Listerine on the viability of the V79 cells

DISCUSSION

Results from the study showed that Hexidine was the most toxic among the three mouthwashes even in low doses. Listerine and Betadine were comparatively less toxic.

It was observed in this study when fibroblasts were exposed to different concentrations of Chlorhexidine, the fibroblast cell death increased as the concentrations increased. This result was in accordance with previous studies which stated that Chlorhexidine reduced gingival fibroblast proliferation in a dose-dependent manner.

Also Mariotti et al[4] suggested that Chlorhexidine will induce a dose-dependent reduction in cellular proliferation and that concentrations of Chlorhexidine that have little effect on cellular proliferation can significantly reduce both collagen and non-collagen protein production of human gingival fibroblast in vitro. Wilken et al.[5] in their study have proved the in vitro cytotoxicity of Chlorhexidine on human gingival fibroblast.

It was also found in this study that Povidone–Iodine at commercially available concentration is cytotoxic to fibroblast cells. This study was in agreement with a previous study, which found that Povidone –Iodine at concentration of 5.0% to 0.05% was lethal to canine embryonic fibroblast in vitro. The findings were in accordance with studies conducted by Lineaweaver et al[6] and Barnhardt et al [7] who proved the cytotoxic effect of Povidone-Iodine on human gingival fibroblasts.

In a study conducted by Pucher and Daniel, human fibroblasts derived from oral and skin tissues were used to test the effects of chlorhexidine on viability, growth, collagen gel contractions, and total protein synthesis. The results demonstrated that chlorhexidine is highly cytotoxic to cells in vitro and various cell functions such as proliferation, collagen gel contraction, and protein synthesis are affected to different degrees by the drug[8].

In an in-vitro study conducted by Heinz-Dieter Müller et al. exhibited the cytotoxic effects of the oral rinses. They concluded that oral rinses are heterogeneous with respect to them in vitro antimicrobial activity against bacteria and their effects on oral cell viability[9].

There have been extensive clinical studies using Chlorhexidine, Listerine and Povidone-Iodine showing significant effect on preventing dental plaque accumulation and gingival inflammation. The results obtained in this study demonstrate the detrimental effect of these three mouth rinses on gingival fibroblast proliferation, which could interfere with wound healing.

CONCLUSION

Chlorhexidine was found to be most toxic when compared to Listerine and povidone iodine. Povidone iodine being the least toxic amongst the three mouth rinses. All the compounds exhibited toxic effect in a dose dependent as well as time dependent manner. The result of this study showed that all three given mouth rinses caused V79 proliferation inhibition.

Ethical Clearance : Taken from Institutional ethical committee AB shetty Memorial Institute of Dental Sciences, Mangalore.

Conflict of Interest: The authors have no conflict of interest to disclose.

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REFERENCES

1. Halawany HS. A review on miswak (Salvadora persica) and its effect on various aspects of oral health. Saudi Dent J. 2012 Apr;24(2):63–9.
2. Erciyas AF, Erciyas K, Sarıkaya R. Genotoxicity of two mouthwash products in the Drosophila Wing-Spot Test. Food Chem Toxicol. 2010 Oct 1;48(10):2577–80.
3. Lewis K. Riddle of biofilm resistance. Antimicrob Agents Chemother. 2001 Apr 1 ;45(4):999–1007.
4. Saad S, Greenman J, Shaw H. Comparative effects of various commercially available mouthrinse formulations on oral malodour. Oral Dis . 2011 Mar;17(2):180–6.
5. Wilken R, Botha SJ, Grobler A, Germishuys PJ. In vitro cytotoxicity of chlorhexidine gluconate, benzydamine-HCl and povidone iodine mouthrinses on human gingival fibroblasts. SADJ [Internet]. 2001 Oct ;56(10):455–60.
6. Lineaweaver W, McMorris S, Soucy D, Howard R. Cellular and bacterial toxicities of topical antimicrobials. Plast Reconstr Surg. 1985 Mar;75(3):394–6.
7. Barnhart BD, Chuang A, Lucca JJD, Roberts S, Liewehr F, Joyce AP. An in vitro evaluation of the cytotoxicity of various endodontic irrigants on human gingival fibroblasts. J Endod. 2005 Aug ;31(8):613–5.
8. Pucher JJ, Daniel JC. The effects of chlorhexidine digluconate on human fibroblasts in vitro. J Periodontol . 1992 Jun;63(6):526–32.
9. Müller H-D, Eick S, Moritz A, Lussi A, Gruber R. Cytotoxicity and Antimicrobial Activity of Oral Rinses In Vitro. Biomed Res Int . 2017;2017:4019723.

Secure and Efficient Subnet Routing Protocol for MANET

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ABSTRACT

Mobile ad hoc Network have no base station wireless network and a decentralized way for a large network[1] The network topology of MANET is in general movable, because the connectivity among the mobile nodes may change location with time due to node mobility and change communication range[1]; therefore, the secure connection established between source nodes to the destination node is very difficult. Some challenges of MANET are congestion control; overhead control and established connection between intended node and recipient node and provides secure data transmission among the nodes. This paper has focused on design an efficient and adaptive subnetting hybrid gateway discovery mechanism on the basis of dynamic time to live value adjustment[2] such that congestion and unnecessary overhead is reduced selecting the subnet head on the basis of one parameters will increase the performance of networks and throughput of the network and provide secure communication[3].

Keywords: *AODV, TTL, PDR, MANET, RREQ, RREP, HYBRID GATEWAY.*

INTRODUCTION

Mobile Ad hoc networks is a complex distributed system. Mobile Ad hoc networks are very useful in current Wireless Technology, it is associated to business, education, socially and in some critical applications like Military etc, The network which is self-configuring wireless links which are connected to each other. However in such Wireless Network will be more exposed to different types of security attacks[4]. Several existing protocols for handling issues of mobile ad hoc network There are three different approaches to gateway discovery first approach is proactive this approach used for the small and less movable network. In proactive routing protocol, each node maintains the information about the other nodes in the form of a table. The second approach is reactive in this approach network is movable but increases the number of nodes then increase delay for search the gateway for a route discovery. The third approach is Hybrid routing protocols in this protocol we combine the best features of proactive and reactive algorithms.[5] Proposed protocol has to divide large networks into small sub network and each sub network has a subnet head and this subnet control all nodes those are in subnet range. Each subnet head node broadcast the message nearest gateway and communicates to each other nodes and selection of subnet head after a periodic interval.[6] For secure communication this paper proposed algorithm Data transmission Evidence and Report, **it contains four phases** first **communication phase, in which nodes communication is sessions and Evidence and token as a security for authenticating nodes which submits in the form of report to Trusted Party (TP), Classifiers phase, involves in classifying fair and cheating reports[7].** In this approach the Subnet Members (SM) submits a report to the Subnet Head (SH) and temporarily stores Evidence as a security token. The reports contain digital signatures. The SH will verify the consistency of the SM report and updates to Accounting Centre (AC). AC will verify the uniformity of reports and clears the cryptographic operations for attacker nodes, the security tokens are requested to classify and expel the attacker nodes which submits wrong reports.[8, 9]

Voting based Subnet

Voting based subnet mechanism invalidates the attacker report through votes from valid nodes. URSA[10] proposed the eviction of malicious node using

voting based. Arboit et al.[11] proposed scheme, where all the participating nodes can vote together. There is No Certification Authority required. The participating nodes itself will monitor the activity and behavior of neighboring nodes. The nodes with variable weight vote in URSA method. Trustworthiness of the participating node is calculated as its weight.

Non-Voting-Based Mechanism

Clulow et al. [12] proposed self destruction of node strategy, in which malicious node behavior can be evocated in one accusation. The attacker node is removed from the network by the accused node in the network. Park et al.[13] proposed a Cluster-based certificate scheme is nonvoting based mechanism, in which the Subnet Authentication is responsible for controlling and managing those node which is enter in the sub network.[14,] in this scheme each participating node stores and manages its own credit account.

Methodology for the proposed protocol

Implementation for this proposed model divided into three sections- (i) In the first section we will describe adaptive hybrid subnet protocol, subnet creation, minimum dropped packets and maximum network throughput. In the second section, we will describe the proposed subnet based adaptive hybrid energy efficient algorithm for increasing the efficiency of the battery, in the third section we will describe proposed algorithm data transmission evidence and report for secure communication in a mobile ad hoc network

Proposed Adaptive Hybrid Subnet Protocol

Subnet Formation

Step1. In the beginning each node is subnet head. Initially the network contains only single node subnet and this state is aceived when the nodes in the network boot up for the first time. Node is considered as subnet Head

Step2. Each node broadcast SH subnet Hello Packet. Each node will broadcast an initial Subnet hello packet (SH). This packet is the basis for determining both the nodes in the subnet and links between the subnet

Step 3. Receiving a SH Packet node generate Subnet Hello Reply Packet SHR if both nodes are not the same member of Subnet. Subnet Hello Reply packet (SHR) is generated by a node, n, when n receives a SH packet from a node in the same subnet as n. The SHR packet for each node is propagated back to the subnet head for that nodes subnet

Step 4. If a node in the same subnet then rebroadcast SH Packet and wait a specified amount of time.

Step 5. The node will send out a Subnet Merge Request Packet (SMR). The SMR packet is sent to a subnet Gateway and is always forwarded up to the subnet head in the recieving subnet. The receiving subnet head then must make the decision of whether or not to merge with the requesting subnet.

Step 6. The Receiving subnet head then must make the decision of whether or not to merge with the requesting subnet. If the decision to merge is reached, then the receiving subnet head will send a Subnet Merge Preapproval packet (SMP) back to the original subnet

Step 7 Receiving a SMP Packet the requesting subnet head must now decide to merge, and then a Subnet merges Approved packet (SMA) is sent. At this point, if requesting subnet head will either be the new subnet head of the merged subnet or will become the new backup subnet head for the merged subnet.

Step 8. If the requesting subnet head will remain the subnet head, then a Subnet Head Backup Packet (SBH) will be sent out to the subnet.

Step 9. If requesting subnet head will become the backup subnet head and will sent out a subnet Head Takeover Packet (SHT) and Merge Subnet A & B and SHT instructs all nodes to set the backup subnet head to be the current subnet head and to set the subnet head as the subnet head node that originated the SHT packet.

The Proposed Adaptive Hybrid Energy Efficient Algorithm [AHEEA] for MANET

THE PROBLEM FORMALIZATION

- Let S_H= {1,……,H} be the set of subnet-heads,
- S_N= {1,…….,N} be the set of ordinary nodes to be assigned to the subnets
- Let d_{ik} =distance between subnet-head i and node k(i=1,……H ; k=1……..,N)
- $r_i=d_{ij}$ when j is the farthest node controlled by subnet-head i

- Matrix L={l_{ij}},dimension=|S_H| x |S_N| where each entry l_{ij} represents the lifetime of subnet-head i when its radius is set to $r_i=d_{ij}$ and it covers n_{ij} ={k ϵ S_N|$d_{ik} \leq d_{ij}$}

S_S = {1…S}, set of subnet-heads and S_N= {1…N} be the set of ordinary nodes to be assigned to the subnet. The lifetime is calculated according to the following equation:-

$$li = \frac{Ei}{\alpha r\ i2+\beta|ni|}$$

Where E_i is the initial amount of energy available at subnet-head i, r_i is the coverage radius of subnet -head i, n_i is the number of nodes under the control of subnet -head i, and α and β are constants.[15 16] Considering that the limiting factor to the network lifetime is represented by the subnet -head's functioning time, the lifetime is defined by

$$L_s=min_{is}\{L_i\}$$

The main objective is to maximize L_s. The Algorithm for assignment of the nodes is as follows

Step 0 Begin **Assignnodes**

Step 1 All nodes i is set of subnetwork

Step 2 calculate the initial Energy of subnet head

Step 3 Every j nodes is the member Subnetwork

Step 4 Compute d_{ij},|n_{ij}|,l_{ij}

Step 5 L_s(new)= L_s(old)= L_s

Step 6 Difference energy Δ=0

Step 7 while(L_s(new)≤L_s(old)-Δ)

Step 8 Δ=Δ+1

Step 9 All nodes i is set of subnetwork

Step 10 Every j nodes is the member Subnetwork

Step 11 Recompute E_i=E_i-Δ($\alpha r_i^2+\beta|n_{ij}|$)

Step12 Update l_{ij} ¥ iϵS_S, jϵS_N

Step 13 ***Selectsubnet*** and update Ls

Step 14 Ls(new)=Ls

Step 15 end while

Step 16 end***Assignnodes***

Proposed Algorithm for Data Transmission Evidence and Report

START

Step1- Initialize node n_i in the network

Step 2- if (n_i is the source node) then encrypted message send

Step 3- E_x ← [R, X, Timestamp, $Massege_x$, $Signature_x$(R, X, Timestamp, H ($Massege_x$))];

Step 4- send (E_x)

Step 5- else

Step 6- if ((R, X, Timestamp are correct) and Verify ($Signature_x$ (R, X, Timestamp, H ($Massege_x$))) = = TRUE)

Step 7- if (n_i is an intermediate node) then

Step 8- Relay the packet;

Step 9- Store ($Signature_x$ (R, X, Timestamp, H ($Massege_x$)) ;

Step 10- end if

Step 11- if (n_i is the destination node) then

Step 12- send ($h^{(x)}$);

Step 13- end if else

Step 14- Drop the packet;

Step 15- Send error packet to the source node;

Step 16- end if end if

Step 17- if (P_x is last packet) then

Step 18-Evidence = {R, X, Timestamp, H ($Massege_x$), $h^{(0)}$, $h^{(x)}$, H ($Signature_x$ (R, X, Timestamp, H ($Massege_x$)), $Signature_D$ (R, Ts, $h^{(0)}$))};

Step 19- Report = {R, Timestamp, F, X};

Step 20- Store Report and Evidence;

Step 21 end if

Step 22 STOP

SIMULATION AND RESULTS

Aggressive research in this area has continued since then, with prominent studies on routing protocols such as AODV, DSR, TORA and OLSR.[17] we evaluate the performance of AODV, OLSR, DSR, TORA and AHEEA ad hoc routing protocols in NS2 [18]. In addition, the mobile nodes were randomly placed in the network to provide the possibility of multihop routes from a node to the server. The performance of these routing protocols is evaluated in terms of power consumption and routing overhead.

Figure 1 shows that, on average, Adaptive Hybrid Energy Efficient Algorithm (AHEEA), remaining battery power than the other five protocols for most network sizes. Most importantly, AHEEA, the based network is more energy efficient in comparison to the other proposed adaptive subnetting algorithm. The AHEEA, protocol based network use less battery power especially in small size networks. The battery power of nodes using DSDV and OLSR protocols decreases steadily starting from fairly high levels. With an increasing number of nodes, the battery power of OLSR based networks decreases faster than those for the other protocols.

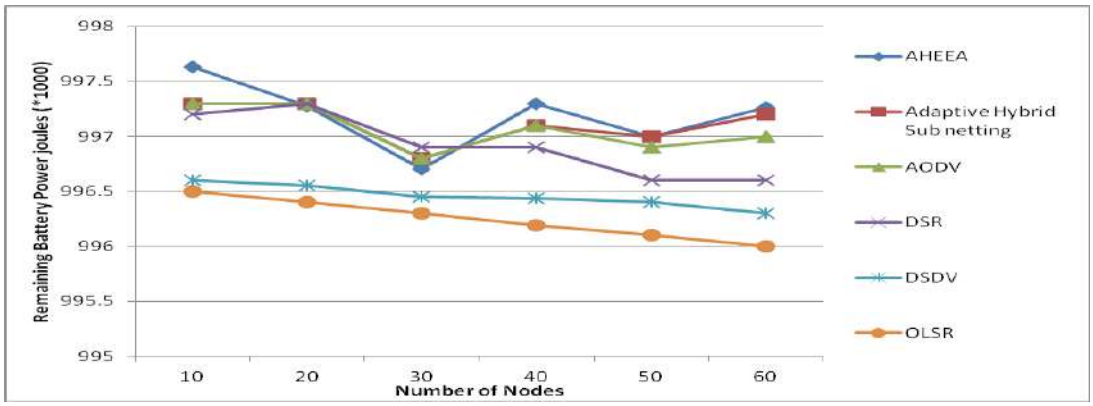

Figure 1: The average remaining battery power

Figure 2 shows the performance of the protocols based on data throughput. It shows that AHEEA, Adaptive Hybrid Subnet, AODV and DSR achieve comparable performance for network sizes greater than 10 nodes. However, Adaptive Hybrid Subnet shows superior performance in larger networks. In Adaptive Hybrid Energy-Efficient Algorithm, Adaptive Hybrid Subnet and AODV protocols, every node does not need to keep information regarding the route between two nodes. This reduces the amount of signaling required for route discovery and maintenance. OLSR and DSDV both show poor performances compared to the other three protocols. This is because both are proactive protocols and require table updates that generate relatively high large Networks, especially in mobile networks, and reduces data rate performance of the network. [19 20]

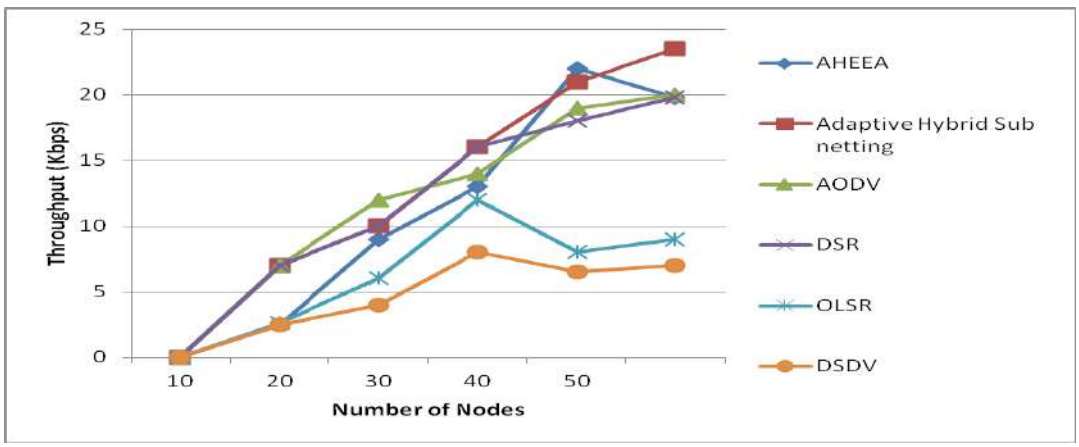

Figure 2: Comparison of data throughput for various network sizes (number of nodes)

Communication and Overhead

In secured communication the authentic nodes communicate with correct reports, thus reducing their node overhead by using light cryptographic techniques. In this approach compute between time versus packet delivered then find some malicious activity like packet drop, this approach tries to manipulate report, and submits report by reducing node overhead.

CONCLUSIONS

This Paper has presented the simulation results and comparison of existing Ad Hoc routing protocols with proposed protocols Adaptive Hybrid Sub netting Protocol and Adaptive Hybrid Energy-Efficient Algorithm (AHEEA). All the results have been presented in terms of the number of packets dropped, remaining battery power, consumed power, throughput, routing load, and dropped packets. Proposed Algorithm AHEEA, the based network is more energy efficient in comparison to the other existing protocol like AODV, DSDV, DSR, and OLSR. Simulation results and a report based submission to AC is defined to classify the fair and cheating nodes. The report based decreases the node overhead by reducing the cryptographic operations. In the case of cheaters a nodes the Evidence is requested and processed and our simulation result shows the node process low overhead Communication for submitting fair reports, the node submitting the correct reports to AC, increasing throughput by delivering the packets.

Conflict of Interest – Nil

Source of Funding- Self

Ethical Clearance – Not Required

REFERENCES

1 Shafinaz Buruhanudeen, Mohamed Othman, Mazliza Othman, Borhanuddin Mohd Ali. Existing MANET Routing Protocols and Metrics used Fowards the Efficiency and Reliability- an Overview, IEEE International Conference on Telecommunications and Malaysia International Conference on Communications. 2007.

2 M. Geetha, R. Umarani and R. Kiruthika, A Comparative Study of Gateway Discovery Protocol in MANET", International Journal of Computer Applications, December 2010, Vol 11, No. 2.

3 K Majumder, S. Ray, and S. K Sarkar, International and Performance Analysis of the Gateway Discovery Approaches in the Integrated MANET-Internet Scenario, IEEE International Conference on Communication Software and Networks, May 2011, 601-605.

4 K. Hamsha, G. S. Nagaraja. Analysis of Security Mechanism Using Threshold Cryptography or Hierarchical Wireless Sensor networks, International Conference on Communication and Signal Processing (ICCSP), 2017. 2017.

5 Sayli N. Mane, A.R. Nigvekar Internet Connectivity Between Mobile Ad hoc Network Using Mobile IP, International Journal of Advanced Engineering Technology, March 2012, Vol. 3, No. 1, 39-41.

6 Rafi U Zaman, Khaleel ur Rahman Khan and A. Venugopal Reddy, A Survey of Adaptive Gateway Discovery Mechanisms in Haterogeneous Networks", International Journal of Computer Network and Information Security, June 2013, 7, 34-42.

7 M. Mahmoud and X. Shen, FESCIM: Fair, Efficient, and Secure Cooperation Incentive Mechanism for Hybrid Ad Hoc Networks, IEEE Trans. Mobile Computing, May 2012, vol. 11, no. 5, 753-766,

8 M. Mahmoud and X. Shen, ESIP: Secure Incentive Protocol with Limited Use of Public Key Cryptography for Multi-Hop Wireless Networks, IEEE Trans. Mobile Computing, July 2011, vol. 10, no. 7, 997-1010.

9 J. Pan, L. Cai, X. Shen, and J. Mark, Identity-Based Secure Collaboration in Wireless Ad Hoc Networks, Computer Networks, 2007, vol. 51, no. 3, 853-865.

10 H. Luo, J. Kong, P. Zerfos, S. Lu, and L. Zhang, URSA: Ubiquitous and Robust Access Control for Mobile Ad Hoc Networks, IEEE/ACM Trans. Networking, Oct. 2004, vol. 12, no. 6, 1049-1063,.

11 G. Arboit, C. Crepeau, C.R. Davis, and M. Maheswaran, A Localized Certificate Revocation Scheme for Mobile Ad Hoc Networks, Ad Hoc Network, Jan. 2008, vol. 6, no. 1, 17-31,

12 J. Clulow and T. Moore, Suicide for the Common Good: A New Strategy for Credential Revocation

in Self-Organizing Systems, ACMSIGOPS Operating Systems Rev., July 2006, vol. 40, no. 3, 18-21.

13 K. Park, H. Nishiyama, N. Ansari, and N. Kato, Certificate Revocation to Cope with False Accusations in Mobile Ad Hoc Networks, Proc. IEEE 71st Vehicular Technology Conf., May 2010. (VTC '10), 16-19.

14 L. Buttyan and J. Hubaux, Stimulating Cooperation in Self-Organizing Mobile Ad Hoc Networks, Mobile Networks and Applications, Oct. 2004, vol. 8, no. 5, pp. 579-592.

15 J Shin, H. Lee, J. Na, A. Ark and S. Kim, Load balancing among Internet Gateway in Ad hoc Networks, Proceeding of 62nd IEEE Vehicular Technology, 2005, 1677-1680,.

16 Jin H. Zhao, Xiao Z. Yang and Hong W. Liu, Load balancing Strategy of multi-gateway for Ad hoc internet connectivity, IEEE International Conference on Information technology : Coding and Computing (ITCC'05), 2005, Volume II, 592-596**.**

17 PATIL V.P. "Performance Evaluation of on demand and Table driven Protocol for Wireless Ad hoc Network ", IJCES, September 2012, Volume 2, Issue 9, 1-13.

18 C. Perkins, E.M. Belding-royer and S. Das, Ad hoc On- demand Distance Vector (AODV) Routing, Experimental RFC 3561, Canadian Journal on Network and Information Security, 2012, Vol. 3 No. 1, 20-25.

19 Dharam Vir, S.K. Agarwal and S.A. Imam, Energy consumption between Gateways of ad hoc and other networks, International Journal of application or Innovation in engineering and Management (IJAIEM), March 2013, Volume 2, Issue 3, 176-186.

20 Deepak Kumar Patel, Rakesh Kumar, Performance Evaluation of an Adaptive Gateway discovery Algorithm for mobile Ad hoc networks , International Journal of Computer Science and information technologies, 2013, Vol 4, Issue 3, 436-441.

Awareness about Privacy and Security of Patient Health Information

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ABSTRACT

Privacy and Security of patient health records is a matter of concern in India, as we gradually move from manual to electronic methods of data management in healthcare. Studies on understanding the awareness about privacy and security among healthcare professionals is a method of identifying the preparedness of the healthcare team and knowing their attitude. A cross-sectional study done using a questionnaire survey among 601 healthcare professionals working in private clinics, handling patient health information, in a specific district of Southern India, showed limited awareness about privacy and security of patient health information. The limiting barriers found were mainly insufficient funds to put security measures, inadequate space, shortage of qualified health information professionals and unenforced laws. Concluding, this study definitely calls for directing attention towards creating awareness about Privacy and Security of Patient Health Information handling.

Keywords: *Privacy, Security, Patient Health Records, Patient Data, Health Information*

BACKGROUND

Privacy refers to those practices which keeps a patient's information protected; it is about a patient's right. Security, on the other hand, is the ability to control access and protect any patient-related information from accidental or intentional disclosures to unauthorized persons, often using various technical controls. (1)

Privacy and security of patient information is of great concern to the medical fraternity and the patients themselves as India rapidly transits from manual to electronic health records. Also, increased statutory regulations, and need for exchange of information between various end users of health information has given added importance to this topic. Experts point towards the fact that these transitions have often not been matched with a legal framework on data collection, processing, analysis, dissemination, use and breaches. (2) Regular reporting of incidences of breach of health information all over the world, definitely points to a gap between the availability of measures to safeguard health information and supporting attitude in that direction, leaving the medical industry vulnerable to instances of regular data breach. The US Department of Health and Human Services, under which the Office of Civil Rights functions, has estimated that in the year 2015 alone there were over 100 million records that were breached. (3) A leading news daily reported in December 2016 about 35,000 patient records being hacked and sensitive information leaked online in the state of Maharashtra in India.(4) Similar incidences of breach of privacy were reported from other states of India as well during the recent years.(5), (6) In the light of such incidences, it is often pointed out that unavailability of separate laws governing data protection and privacy could be the major reasons. Of note here is the fact that India has various laws and acts to ensure protection and privacy

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of information provided by the patient to the doctor, including that related to their personal and domestic lives, like IT Act of India 2008 and The Indian Medical Council (Professional Conduct, Etiquette and Ethics) Regulations, 2002, Consumer protection act 1986, Indian evidence act, Law of privileged communication, Law of Torts, and IPC section 52 (good faith), section 80 (accident in doing lawful acts) section 89 (for insane and children) section 90 (consent under fear) section 92 (good faith/consent), section 93 (communication in good faith), which are intended to protect the privacy and security of the patient health information. It has also been argued that these legal frameworks are seldom enforced and most importantly the lack of awareness about these acts and laws among the healthcare professions cannot be negated either.

The present study, conducted among the healthcare professionals working in clinics and nursing homes of a district in southern India, captures the awareness among the healthcare providers about Privacy and Security of patient health information.

MATERIALS AND METHOD

Study setting—Clinics and Nursing homes of a community in southern India, which has 17 nursing homes and 247 clinics, governed by the District Health Office (DHO).

Study design—A cross sectional study was carried out from February to May 2016

Study population—Doctors, nurses, allied health professionals, pharmacists, and laboratory technicians handling patient health information.

Sampling method—For the questionnaire survey, the samples were selected through convenience sampling method, employing healthcare professionals who consented for participating in the study and were available during the data collection. For in-depth interview, simple random sampling, using random number table, was used to identify the participants.

Sample size—For survey, 601 participants, consisting of 113 doctors, 320 nurses, 43 pharmacists, 76 laboratory technicians, and 49 Allied Health professionals participated and for in-depth interview, 7 participants, 2 doctors, 3 Nurses, 1 pharmacist, 1 laboratory technician and 1 physiotherapist consented to participate from the list drawn.

Exclusion criteria—Individuals not willing to participate and not handling patient health information

Data collection—Data was collected from clinics and nursing homes of a community in southern India, using a structured questionnaire. Investigator's observation and in-depth interviews supplemented the data findings. The study questionnaire was developed in English according to the objective of the study. Written consent was obtained from each participant before administering the questionnaire. The principal investigator was present throughout to explain and provide clarifications, if any, during administration. The completed questionnaires were then collected, coded and included for analysis. Observations were made and field notes were made to supplement our findings. For added information on data breach and barriers to privacy and security of patient health information, 7 participants who consented to participate were included and interviews conducted with the selected participants.

Data analysis—The data was analysed based on the study objectives using descriptive and inferential statistics, employing SPSS version 20. The data was presented in terms of frequency and percentage.

RESULT

Demographic details

Out of the total 601 respondents who participated in the study 135 (22.5 percent) were Male and 466 (77.5 percent) were Females. Mostly the Nurses, who constituted 53.4 percent of the sample size, and the Allied Health professionals were females. The healthcare professionals in this community were mostly in the age-group of 20 to 35 years, with 32 percent of respondents having work experience of 1-5 years while 23.6 percent of respondents had work experience of 6 to 10 years.

Ownership

In our survey, we found that only 3.3 percent of the respondents knew that healthcare facilities are the actual owners of the medical records/files; while 30.3 percent thought that doctors are the owners, 64.7 percent presumed that the medical records officers/managers are the owners and rest told that patients are the owners. When asked if they knew "who is the owner of health information contained in the medical records," only 2 percent (12) of these respondents knew that the patient is the owner of their own health information contained

inside the medical records maintained by the hospitals/ healthcare facilities. There are laid down policies in this regard and an awareness in this regard is of utmost importance.

Privacy and Security – what does it mean to them?

More than 99 percent respondents of our study said the terms privacy and security means the same for them and 97 percent of the respondents felt that it is acceptable to discuss the details of a patient's condition freely in a cafeteria. Also, paper based medical records were found on the counter with no safety of information ensured.

The study revealed that most healthcare professionals did not bother much about these aspects. They discussed the case with other providers in presence of other patient and sometimes even carried out physical examination in the vicinity of other patients. They discussed their case in the cafeteria of their facilities and did not think it was unacceptable. The acceptance could be due to the notion that the discussion takes place to find solutions to a clinical problem. Lack of space and heavy patient load were cited as the main reasons for not being able to follow all privacy and security norms. To quote a Physician in this regard, "tending to the patient is more important for me"

Storage, Disposal and Data breach

Surprisingly, 97 percent of the respondents said that patient health information can be viewed by anyone who wants the information. According to Medical Council of India's code of ethics, chapter 1, B-1.3.2, "If any request is made for medical records either by the patients/ authorized attendant or legal authorities involved, the same may be duly acknowledged and documents shall be issued within the period of 72 hours," thus making it mandatory to obtain consent of the owners of health information and restricting access to such information. [7] Though the justification given by most of respondents were that the information is only viewed by healthcare staff of their own center and this is for the continuity of the care; still making patient health information available to all increases the susceptibility to violation of patients' right to privacy of "sensitive information".

The study found that most clinics and nursing homes in this district still relied on paper-based medical records, but they have started migrating to a computer-based system. Computers mostly had brief history of the patient and also discharge summary at many centres. Most respondents (78 percent) did not find any problem in storing patient data in computers, with or without specific security features. Many healthcare personnel were also found to operate computers without any passwords; this practice can lead to breach of privacy of sensitive information. The respondents were of the opinion that their settings are safe, and 81 percent respondents did not feel the need to have any separate internal security measures to protect Medical records in their settings. They felt that the existing measures are good enough and any additional measures would only mean additional expense. Computer-based health information is more susceptible to hacking than manual records. Rindfleisch classified privacy threats into organisational threats and systemic threats; further the National Research Council detailed the levels of organisational threats as accidental disclosure, insider curiosity, data breach by insider and data breach by outsider with physical intrusion. Strong and updated security measures are the only ways to keep patient health information safe. Section 43(a) and section 72 of the Information Technology Act provide the broad framework for the protection of personal information in India. [8], [9]

Since the medium of storage or transmission of such electronic medical record will be owned by the healthcare provider, it is the duty of the provider to notify a patient of any data breach that the nursing home or clinic comes to know about and no accidental disclosure can be neglected. Most of the respondents were aware of this fact. It is the duty of healthcare facility to notify a patient of any data breach (unauthorized access or leak) that comes to their notice. A similar incident had occurred in Sentara Healthcare, where they notified 5,454 patients regarding their data breach. The data breach affected vascular and thoracic patients who received medical services at Sentara Healthcare's Virginia hospitals between 2012 and 2015.

Campbell et.al (2007) found that around 28-35 percent of patients showed neutrality towards their health information being used by physicians for storage, disposal or other purpose. [10] The perspective of the healthcare professionals in our setting showed that 92 percent of them agreed that health information can be given to external agencies for storage or disposal with de-identification. This difference in the acceptance of disseminating health information to external agencies

among two different categories of population in two countries can be accounted to their awareness about the consequences of unethical use of patient health information.

India makes it illegal to disclose gender of the foetus even to the parents. According to the The Pre-Conception and Pre-Natal Diagnostic Techniques (Prohibition of Sex Selection) Act (PCPNDT Act), which prohibits the sex selection for preventing the misuse of prenatal diagnostic techniques for sex determination leading to female foeticide. [(11), (12)] More than 95 percent of the healthcare professionals were aware of this.

Limiting factors to privacy and security of patient health information

Observations and key themes generated from the in-depth interviews with the healthcare personnel, pointed towards some factors which are the major barriers to the practice of privacy and security at the nursing homes and clinics of this community.

Patient load: Owners of nursing homes and clinics expressed that there is ever-increasing patient load that visit them as the patients, and it is always about providing services first. They said that they hardly find time to think about any other aspect of healthcare.

Cost factor: Most healthcare professionals felt that incorporating security measures involves investing in additional infrastructure, which often leads to additional cost. Most of them felt that the patients might not be willing to pay extra and increased cost can actually result in losing clients.

Lack of knowledge on the issue: The healthcare professionals were not very clear about the issue to privacy and security. They were more worried about perfecting their documenting and reporting activities.

Lack of ownership: The clinics and nursing homes in this area rely on "Visiting healthcare professionals," who are employed elsewhere or are freelancers and come to these settings depending on the requirements. These personnel are often less informed about the regulations that are to be adhered to and many of them even do not bother.

IMPLICATION OF STUDY

The study encompasses a multidisciplinary group which includes doctors, nurses, pharmacists, lab technicians and other health related professionals who handle patient health information. Thus the result could be generalized for all healthcare professionals handling health information. The study also points to the fact that awareness programmes to propagate the privacy and security related issues among the healthcare professionals working in Clinics and Nursing homes are the need of the hour.

Ethical Consideration: Ethical clearance was obtained from the institutional review board of an Indian medical college prior to the administration of the survey. Permission to carry out the study was formally obtained from the District Medical Officer (DHO) of the region. Further permissions were taken from each clinic, and nursing home before approaching for the study. Written consent from the respondents were also obtained before interview, after explaining the implications. It was assured to all, that the information collected for this study will be strictly used for academic purpose only, without disclosing individual identity.

CONCLUSION

This study throws light on the existing state of awareness of the healthcare professionals working in private Nursing homes and Clinics about the ownership, storage and disclosure of patient health information. Factors like work pressure, shortage of professionals, or even outlook towards issues like privacy and security are the main barriers identified in the study. Based on the evidence generated in this study we draw the attention of public health policy makers to empower the private healthcare providers across the geographical area about the basic principles of health information handling, thus contributing to improved protection of patients' right to privacy and security of health information. Training programs could be the immediate solutions which can empower as well as bring the change in attitude of the healthcare professionals.

Conflict of Interest – None

Source of Funding – Self

REFERENCES

1. Appari A, Johnson M. Information security and privacy in healthcare: current state of research. International Journal of Internet and Enterprise

Management. 2010; 6: 279.

2. Nass S, Levit L, Gostin L. Beyond the HIPAA privacy rule. Washington, D.C.: National Academies Press; 2009.
3. Diane Doebele Koch R. Is the HIPAA Security Rule Enough to Protect Electronic Personal Health Information (PHI) in the Cyber Age? [Internet]. Healthfinancejournal.com. 2017 [cited 30 June 2017]. Available from: http://healthfinancejournal.com/index.php/johcf/article/view/67
4. Hackers Target Diagnostic Lab, Leaks Medical Records, Including that of HIV Patients [Internet]. http://www.outlookindia.com/. 2017 [cited 30 June 2017]. Available from: http://www.outlookindia.com/newswire/story/hackers-target-diagnostic-lab-leaks-medical-records-including-that-of-hiv-patients/961748
5. Privacy in Healthcare: Policy Guide [Internet]. The Centre for Internet and Society. 2017 [cited 30 June 2017]. Available from: https://cis-india.org/internet-governance/blog/privacy-in-healthcare-policy-guide
6. Data Ownership of EHR | National Health Portal of India [Internet]. Nhp.gov.in. 2017 [cited 30 June 2017]. Available from: https://www.nhp.gov.in/data-ownership-of-ehr_mtl
7. Ahmad N. Female feticide in India. Issues Law Med. 2010 Summer;26(1):13-29
8. Rindfleisch T. Privacy, information technology, and health care. Communications of the ACM. 1997; 40: 92-100.
9. For the record: protecting electronic health information. Choice Reviews Online. 1998; 35: 35-2735-35-2735.
10. Campbell B, Thomson H, Slater J, Coward C, Wyatt K, Sweeney K. Extracting information from hospital records: what patients think about consent. Quality and Safety in Health Care. 2007; 16: 404-408.
11. Kurpad S, Bhide A. Sexual boundaries in the doctor–patient relationship: Guidelines for doctors. Indian Journal of Psychiatry. 2017; 59: 14.
12. Hirve S. Abortion Law, Policy and Services in India: A Critical Review. Reproductive Health Matters. 2004; 12: 114-121.

Correlation between Type of Diet and Periodontal Parameters

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ABSTRACT

Introduction: Investigations about the Correlation between type of diet and periodontal parameters are very few and with less sample size. The main objective of this study was to establish the possible co-relation between type of diet and Wear patterns (erosion, abrasion, attrition) periodontal status (gingival index, periodontal pocket depth), plaque index and oral health parameters along with the help of questionnaire survey.

Materials and Method: Sample sizes of 260 healthy male and female subjects within the age group of 18-50 years were equally distributed into vegetarians and non-vegetarian groups. Clinical checkup will include examination of all the parameters. A questionnaire has been prepared for the participants for assessing the oral habits, dietary habits and the knowledge of oral health care. Statistical analysis of the data was conducted using pearson chi-square tests

Results: Periodontal findings comparing both the groups were not statistically significant. In the questionnaire survey, it was found that halitosis was greater in non-vegetarians when compared to vegetarians which were statistically significant. The remaining findings were not statistically significant.

Conclusion: Type of diet does not really affect the periodontal status of an individual. Both vegetarians and non-vegetarians show almost same level of gingival index, plaque index and periodontal pocket depths with dental education slightly lower in non-vegetarians than vegetarians with equal amount of regular dental visits. However, with proper oral hygiene procedures such as vertical brushing, brushing twice daily, using interdental aids and regular dental visits alone one can maintain good periodontal health regardless of diet being followed.

Keywords: *Vegetarian, Non-vegetarian, Periodontal parameters, full mouth examination, questionnaire, wasting diseases*

INTRODUCTION

Relation between diet and oral health is the most basic and often controversial subject and also there are increasing number of individuals complaining about oral health. Eating habits in developed and developing countries have changed in recent years. Various food stuffs have been introduced into diet that previously did not form a part of nutritional choices. This has resulted in an enrichment of daily diet, with the opportunity to vary foodstuffs more often and moreover this has led to the assumption, at least apparently, of wider spectrum of nutrients required for the wellbeing of the body.[1] Considering the relevance of effects of diet and food habits on oral health care, recent research reports have showed an actual co-relation between diet with that of parameters such as erosion ,attrition ,abrasion, gingivitis, periodontal status, amount of plaque etc. To understand this relation and promote better oral health , better knowledge of diet is very important.

However, there is a lack of established facts and knowledge with regard to the concerned co-relation of

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diet and oral health parameters[2]. The purpose of this clinical study was mainly to understand and establish a better pathway to improve oral hygiene among the people in society with different food habits.

MATERIALS AND METHOD

Sample size of 260 healthy male and female subjects within the age group of 18-50 years, equally distributed in both the groups (vegetarians and non-vegetarians) respectively have participated in this study. Taking into consideration the possible risk factors affecting the parameters taken for the study, the exclusion criteria were: subjects with medical disorders, undergoing antibiotic or other anti-microbial therapy.

The inclusion criteria were subjects who were smokers and alcoholics. The subjects received verbal and written information about the study.

This study was a randomized controlled clinical study which included 260 participants, divided into two groups. Clinical checkup included examination of the following parameters: wearing of teeth, plaque index, periodontal status apart from which also the other parameters like color of gingiva, depth of periodontal pockets if present, gingival inflammation, bleeding on probing, number of decayed, missing teeth ; that is a full mouth assesment[2].A questionnaire was prepared for the participants for assessing the habits and the knowledge of oral health care among them. This was also done to sub categorize participants under the major study groups to narrow down the results obtained to a more accurate conclusion.

Baseline data on the medical history and previous hospital visits of the participants was recorded to minimize the factors affecting the results of the study and maintain the exclusion criteria. The participants were asked to answer the questionnaire.

Following this, clinical check-up was done on subjects for all the parameters included in the study using mouth mirror, an explorer and a periodontal probe[2]. The subjects were examined mainly for plaque to calculate plaque index, periodontal status, wearing of teeth which included abrasion, attrition and erosion and also for other parameters such as gingival inflammation, bleeding on probing and depth of gingival pocket.

Based on the clinical check-up the participants were asked to undergo dental treatment if needed or advised to take necessary oral prophylactic measures.

Clinical assessment of plaque index and gingival index was performed on four sites (buccal, lingual, mesial, distal) of the six key teeth (FDI tooth number 16,12,24,36,32,44) according to Loe H & Silness J. [3-6]. Each of the sites was given a score from 0-3 depending on the severity of the gingival condition.

Periodontal pocket depth and clinical attachment loss was recorded using William's graduated periodontal probe

Statistical analysis-

The calculation of the sample size was carried out using nQuery Advisor 6.0 (Statistical Solutions, Saugas, MA, USA). The analysis showed that a sample size of 160 in each group had a power of 80%. The recorded data were documented and analysed by the data procession program SPSS 17.0 for Windows (SPSS, Chicago, IL, USA).

RESULTS

In this study, 130 healthy male and female subjects aged 18-50 years for both the groups were included as participants. The prevalence of smoking and alcohol consumption was statistically similar in both the groups, with the non-vegetarian group being slightly greater.

Mean and range values of periodontal parameters are presented in table-1. There was greater probing depth in the vegetarian group compared to the non-vegetarian group, which was statistically not significant. While comparing the plaque index, it was higher in the vegetarian group and was statistically non-significant. But, even though statistically non-significant, the gingival index was seen to be a little greater in the non-vegetarian group when compared to the vegetarian group.

Table-1: Results of T-test for plaque index, gingival index and probing pocket depth among vegetarians and non-vegetarians

	1. DIET	N	Mean	Std. Deviation	t	df	P VALUE
PI	VEGETARIAN	129	1.22062	0.473661	1.299	258	0.195
	NON VEGETARIAN	131	1.14313	0.487665			
GI	VEGETARIAN	129	1.02744	0.560884	-0.173	258	0.863
	NON VEGETARIAN	131	1.03977	0.588518			
PPD	VEGETARIAN	129	2.7669	0.677827	0.506	238.97	0.614
	NON VEGETARIAN	131	2.71626	0.920669			

The wear pattern was not same among both the groups. Vegetarians had greater amount of attrition as compared to non-vegetarian group out of which occurrence of generalized attrition was found more in non-vegetarians. The cervical abrasion was more in non-vegetarian group as compared to vegetarians. This was also associated with the increased horizontal technique of brushing seen in non-vegetarian group.

Analysis of questionnaire showed that vegetarians and non-vegetarians had similar frequency of oral hygiene maintaining practices. It revealed that both the groups had similar number of dental visits. The brushing technique among the non-vegetarian group was more of horizontal technique when compared to the vertical technique used by vegetarian which was statistically significant. Also another statistically significant finding in the questionnaire was that halitosis was a more common complaint among the non-vegetarian group when compared to the vegetarian group. Level of dental education was about the same in both the groups apart from the type of brushing.

DISCUSSION

The effects of a vegetarian diet on systemic diseases like cancer, type 2 diabetes and coronary heart diseases have been studied by various authors and revealed predominantly less systemic diseases in vegetarians.[8,9]. Studies investigating correlations between vegetarianism and oral health are rare. Most authors assessed dental parameters or performed a saliva test.[10-14] In this study, emphasis on effect of diet on periodontal parameters is given. A very few studies have shown effect of diet on periodontal parameters as most of them compare oral health care among vegetarians and nonvegetarians.[15-18] Also, the studies done earlier have a comparatively smaller sample size (20-60), whereas this study has a significant sample size (n=130).

In addition, this study along with investigation of plaque score, gingival status, wear pattern have also gathered data regarding brushing technique, oral habits (smoking, alcoholism), oral hygiene practices, level of dental education and oral health problems via a multiple choice based questionnaire.

Our data indicates plaque index is slightly higher in vegetarian compared to non-vegetarian but it is not statistically significant. In our study the gingival index among non-vegetarians is slightly greater than vegetarians, yet statistically not significant. Since both the interrelated indices are inconsistent in both the groups and are almost similar, we believe that type of diet does not affect the periodontium in further causing gingivitis or periodontitis. In contrast a recent study by I Staufenbiel et al [2] in 2013 showed that gingival inflammation was significantly lesser in vegetarians. In addition, a study by Linkosalo et al.[16] revealed less bleeding on probing in vegetarians.

There are several pathways, which may lead to less inflammatory signs. Generally, vegetarians show more physical activity and a lower BMI. Hence, the prevalence of obesity, which may cause an increased local inflammatory response is lower. [19] Additionally, vegetarians consume a higher amount of antioxidants, which improves immune response, [20] and may lead to less inflammation.

Second, according to our study the average periodontal pocket depth in vegetarians was slightly higher than non-vegetarians. This is explained by the gingival score for vegetarians which was found slightly higher suggesting the presence of plaque causing slight loss of attachment, increasing the pocket depth. This may suggest chance of developing periodontal destruction irrespective of the type of diet and both vegetarians and non-vegetarians are equally susceptible to periodontal destruction. This is in contrast to the importance of an adequate nutrition for a healthy periodontium which was documented by Jenzschet al.[21]They demonstrated that solely a dietary change from non-vegetarian to vegetarian, according to the recommendations of Korber et al.[22]leads to better periodontal conditions. Jenzsch et al.[21] showed that 1 year after a dietary change without affecting dental hygiene and without dental therapy, patients had lower PPDs, less inflammatory signs and lower concentrations of interleukin-1β and interleukin-6 in the gingival crevicular fluid.

Third, the wear pattern observed among both the groups revealed that generalized attrition was more prevalent in non-vegetarians compared to vegetarians, but attrition of selected teeth was more common in vegetarian group. However, prevalence of cervical abrasion was notably greater in non-vegetarians than vegetarians. The potential etiological factors for such non-carious cavities are not very clear but it can be attributed to improper horizontal brushing technique. Interestingly, increased use of horizontal brushing technique in non-vegetarians was seen which was statistically significant.

This is in contrast to the recent study report given by Herman et al in 2011[1, 15], stating that vegetarians are more susceptible to non-carious cavity. He reported horizontal brushing technique is more in vegetarians than in non-vegetarians to his conclusion. In contrast, other authors could not find a different prevalence of erosion between vegetarians and non-vegetarians. Herman et al. [23] evaluated the prevalence of erosion and the consumption of acidic products in vegetarians and non-vegetarians. Regarding the prevalence of erosion, they could not show significant differences between the groups, although a significantly more frequent consumption of acidic products was observed among vegetarians.

Questionnaire analysis revealed equal level of dental education among both the groups and also similar frequency of regular dental visits. In contrary to this, various authors have showed higher level of dental education in vegetarians [24, 25] and also several studies have reported a lower use of prescription medications and health services by vegetarians.[25]. Statistically significant finding obtained from questionnaire reveals greater horizontal brushing in non-vegetarian group, this can be co-related to the increased amount of cervical abrasion seen in non-vegetarian group than in vegetarian group. This gives us quite a clear picture of how dental education is related to brushing technique which if faulty may cause cervical abrasion as seen in the non-vegetarian group.

Another statistically significant result from the questionnaire tells us halitosis was more common in non-vegetarians, which could probably arise because of the basic biochemical degradation of major component which constitutes an individual's diet. Meat being rich in protein undergoes putrefaction unlike carbohydrate that undergoes decomposition. Vegetarians usually tend to have high carbohydrate and low protein diet. When the results of smoking and alcoholism were matched in between vegetarians and non-vegetarians, both the group had similar distribution of smokers and alcoholics. This is in contrary to a study which states that Vegetarians consume less tobacco and alcohol, are physically more active and have a lower BMI compared with nonvegetarians.[21, 22]

CONCLUSION

Type of diet does not really affect the periodontal status of an individual. Both vegetarians and non-vegetarians show almost same level of gingival index, plaque index and periodontal pocket depths with dental education slightly lower in non-vegetarians than vegetarians with equal amount of regular dental visits. However, with proper oral hygiene procedures such as vertical brushing, brushing twice daily, using interdental

aids and regular dental visits alone one can maintain good periodontal health regardless of diet being followed.

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REFERENCES

1. Al-Dlaigan YH, Shaw L, Smith AJ. Vegetarian children and dental erosion.International Journal of paediatric dentistry 2001;11:184-92
2. I Staufenbiel, Knut Weinspach, G Forster, W Geurtsen, H Gunay. Periodontal condition in vegetarians: a clinical study ; European journal of clinical nutrition 2013
3. Rahmatulla M, Guile EE. Relationship between dental caries and vegetarian and nonvegetarian diets. Community Dent Oral Epidemol 1990; 18 : 227-8
4. Chaves ES, Wood RC, Jones AA, NEWbold DA, Manwell MA, Kornman KS.J Clin Periodontology 1993; 20:139-43
5. Ainamo J, Bay I. Problems and proposals for recording gingivitis and plaque. International Dental Journal 1975;25:229-35
6. Silness J, Loe H. Periodontal disease in pregnancy. II. Correlation between oral hygiene and periodontal condition. Acta Odontol Scand 1964;22:121-35
7. L.Laffranchi, F.Zotti, S.Bonetti, D.Dalessandri, P.Fontana. Oral implication of vegan diet: Obeservational study ; Minerva stomatol 2010;59
8. Key TJ, Appleby PN, Spencer EA, Travis RC, Allen NE, Thorogood M et al. Cancer incidence in British vegetarians. Br J Cancer 2009; 101: 192–197.
9. McEvoy CT, Temple N, Woodside JV. Vegetarian diets, low-meat diets and health:
10. a review. Public Health Nutr 2012; 15: 2287–2294.
11. Linkosalo E, Markkanen H. Dental erosions in relation to lactovegetarian diet. Scand J Dent Res 1985; 93: 436–441.
12. Rahmatulla M, Guile EE. Relationship between dental caries and vegetarian and non-vegetarian diets. Community Dent Oral Epidemiol 1990; 18: 277–278. 12. Johansson G, Birkhed D. Effect of a long-term change from a mixed to a lactovegetarian diet on human saliva. Arch Oral Biol 1994; 39: 283–288. 13. Johansson G, Ravald N. Comparison of some salivary variables between vegetarians and omnivores. Eur J Oral Sci 1995; 103: 95–98.
13. Laffranchi L, Zotti F, Bonetti S, Dalessandri D, Fontana P. Oral implications of the vegan diet: observational study. Minerva Stomatol 2010; 59: 583–591.
14. Linkosalo E. Dietary habits and dental health in Finnish Seventh-Day Adventists.
15. Proc Finn Dent Soc 1988; 84: 109–115.
16. Linkosalo E, Ohtonen S, Markkanen H, Karinpa¨a¨ A, Kumpusalo E. Caries, periodontal status and some salivary factors in lactovegetarians. Scand J Dent Res 1985; 93: 304–308.
17. Sedgley CM, Chu CS, Lo EC, Samaranayake LP. The oral prevalence of aerobic and facultatively anaerobic gram-negative rods and yeasts in semi-recluse human vegetarians. Arch Oral Biol 1996; 41: 307–309.
18. Sherfudhin H, Abdullah A, Shaik H, Johansson A. Some aspects of dental health in young adult Indian vegetarians. A pilot study. Acta Odontol Scand 1996; 54: 44–48.
19. Tonstad S, Butler T, Yan R, Fraser GE. Type of vegetarian diet, body weight, and prevalence of type 2 diabetes. Diabetes Care 2009; 32: 791–796.
20. Kuzmanova D, Jansen ID, Schoenmaker T, Nazmi K, Teeuw WJ, Bizzarro S et al. Vitamin C in plasma and leucocytes in relation to periodontitis. J Clin Periodontol 2012; 39: 905–912.
21. Jenzsch A, Eick S, Rassoul F, Purschwitz R, Jentsch H. Nutritional intervention in patients with periodontal disease: clinical, immunological and microbiological variables during 12 months. Br J Nutr 2009; 101: 879–885.
22. Ko¨ rber KMTLC. Vollwerterna¨hrung. Konzeption einer zeitgema¨_en und nachhaltigen Erna¨hrung. Haug: Stuttgart, Germany, 2004.
23. Herman K, Czajczyn´ ska-Waszkiewicz A, Kowalczyk-Zaj ˛ac M, Dobrzyn´ ski M. Assessment of the influence of vegetarian diet on the occurrence of erosive and abrasive cavities in hard tooth tissues. Postepy Hig Med Dosw 2011; 65: 764–769.
24. Davey GK, Spencer EA, Appleby PN, Allen NE, Knox KH, Key TJ. EPIC-Oxford: lifestyle characteristics and nutrient intakes in a cohort of 33

883 meat-eaters and 31 546 non meat-eaters in the UK. Public Health Nutr 2003; 6:259–269.

25. Baines S, Powers J, Brown WJ. How does the health and well-being of young Australian vegetarian and semi-vegetarian women compare with non-vegetarian? Public Health Nutr 2007; 10: 436–442.

Nutritional Assessment in Obese Children with and Without Non-Alcoholic Fatty Liver Disease (NAFLD) in an Urban Area of Punjab, India

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ABSTRACT

Background: Non-alcoholic fatty liver disease (NAFLD) has been reported recently as the most frequent liver disease among obese children and adolescents in industrialized countries. **Objective:** Nutritional status of obese children with and without NAFLD. **Methodology:** We studied 160 obese children of 5-18years age. Their anthropometric, biochemical measurements and ultrasonography were carried out to identify NAFLD in them. Z-score of body mass index (Z- BMI), mid arm circumference (MAC), waist circumference (WC) and triceps skinfold thickness (TSF) were done. Serum alanine aminotranferase (ALT), aspartate aminotranferase (AST), gamma-glutamyl-transferase (GGT) low-density lipoprotein cholesterol (LDL-c), high-density lipoprotein cholesterol (HDL-c), triglyceride (TG), cholesterol, FBG(fasting blood glucose), high sensitivity C-reactive protein (HSCRP) and uric acid were measured. Their eating habits and dietary intake were recorded. **Results:** These patients were divided in to two groups: group1: without NAFLD (n= 54) and group 2: with NAFLD (n=106).NAFLD was detected in 66.2% of obese children. Median Z-BMI, MAC, TSF, WC and ALT, AST, GGT, TG, FBG, HSCRP, uric acid were significantly higher in NAFLD group as compared to without NAFLD($p<0.05$). HDL-c was significantly lower in NAFLD group ($p<0.001$). Daily consumption of soft drinks (60.4 %) and fried chips (58.5%) were more in NAFLD group than without NAFLD group. **Conclusion:** Z-BMI, MAC, TSF, WC and ALT, AST, GGT, TG, FBG, HSCRP and uric acid were significantly higher in NAFLD and HDL-c was lower but most significant associated risk factors with NAFLD were TG and Z-BMI. Calorie intake was more in obese children but excess in NAFLD group. Early lifestyle interventional approach for the treatment of NAFLD can prevent nonalcoholic steatohepatitis (NASH) and cirrhosis.

Keywords: *NAFLD; risk factors; obesity; children; adolescents; lifestyle*

INTRODUCTION

Obesity is one of the major public health threat that is increasing worldwide. Currently, World Health Organization (WHO) global estimated that more than 340 million children and adolescents aged 5-19 years are overweight or obese. Overweight or obesity is most prevalent in north Indian children according to epidemiology survey conducted in different states of India and found that 19% combined prevalence of overweight or obesity.(1) Recent researches proved that the development of non-alcoholic fatty liver disease (NAFLD) in children is vigorously associated with

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obesity and its prevalence is up to 70-80%.[2,3] NAFLD is the one of the common upcoming causes of chronic liver disease in pediatric population with an incidence of 3-10%. [4] It is macro vesicular fat accumulation in more than 5-10% of hepatocytes and it encompasses spectrum of liver disease ranging from steatosis, steatohepatitis, fibrosis to cirrhosis.[5] Sartorio et al. concluded that Z score of body mass index (BMI), serum alanine aminotranferase (ALT), uric acid, glucose during oral glucose tolerance test (OGTT) and insulin during OGTT were independent predictors of NAFLD in obese children but most predicted by ALT and Z-BMI.[6] However, significantly high levels of triglyceride (TG), glucose, insulin, serum ALT, increased BMI and waist circumference (WC) are all possible clinical features of NAFLD in pediatric obesity.[7] Moreover, the diet of children with NAFLD is rich in high fructose corn syrup (HFCS), meat, saturated fat and cholesterol and low in consumption of dietary fiber, fish, omega-3 fats and vitamin E.[8] Excessive dietary fructose consumption in form of soft drinks is associated with NAFLD and it affects carbohydrate and lipid metabolism cause hepatic steatosis by increasing lipid peroxidation.[9] HFCS (mixture of glucose: 42% and fructose sugars: 53-55%) has been directly linked with growth of fat cells, produce oxidative stress and nitric oxide synthase inhibition.[10,11] More recently, another study showed excess intake of refined carbohydrates and sedentary lifestyle are the major significant risk factors for NAFLD occurrence in obese children.[12] Central adiposity and higher BMI is widespread in Punjab, because of excessive adoption of western diets among children and poor dietary patterns may be related with pathogenesis of NAFLD. Therefore lifestyle-based intervention has emerged as cornerstone modality for the prevention of NAFLD in obese children. Before planning the dietary intervention, nutritional screening is essential in these children so that treatment could be given according to their risk factors. In present study, we assessed the nutritional status of obese children with and without NAFLD and have also highlighted the risk factors and dietary intake in them.

Material and Methods:

A cross-sectional study was conducted from December 2016 to October 2017, 160 obese children of age group 5-18 years were enrolled on the basis of BMI ($\geq 95^{th}$ percentile) for study from schools of Jagraon city, Punjab, India. Fasting blood tests for predicting NAFLD were performed at Babe Ke Medical Hospital, Moga, Punjab.

Inclusion criteria: 160 children of age group ranging from 5 - 18 years with a BMI of $\geq 95^{th}$ percentile for age and gender using WHO standard reference and without alcohol intake.

Exclusion criteria: Secondary obesity, patients on medications, Hepatitis B (HBV) and Hepatitis C (HCV), Hepatitis A & E infection, wilson disease, autoimmune hepatitis (AIH).

Ultrasonography (USG) (convex transducer 2-5MHz probe) was performed by radiologist by using following criteria:

1: Mild steatosis: Slightly increased echogenicity of liver parenchyma, normal visualization of diaphragm and intrahepatic blood vessels.

2: Moderate steatosis: Markedly increased echogenicity of liver parenchyma, slightly impaired visualization of diaphragm and intrahepatic vessels.

3: Severe steatosis: Severely increased echogenicity of liver parenchyma, with poor or no visualization of diaphragm and intrahepatic vessels and posterior part of the right liver lobe.

Normal liver was defined by the absence of fatty liver. On the basis of this, children were divided in two categories: Obesity with NAFLD (n=106) and obesity without NAFLD (n=54).

Nutritional Assessment: Anthropometric measurements: weight was measured by Dr. Diaz digital weighing scale to the nearest 0.1kg. Height was measured by measuring tape to the nearest 0.1cm. BMI was calculated by weight (kg)/height (m^2). Z-BMI was calculated from WHO reference data.[13] TSF(triceps skinfold thickness) was measured to the nearest 0.2 mm by Harpenden skinfold caliper (Holtain Ltd.). MAC (mid arm circumference) and WC (at the midpoint between the lowest rib and iliac crest) both were measured by measuring tape to the nearest 0.1cm. Laboratory measurements: Fasting serum alanine aminotransferase (ALT), aspartate aminotransferase (AST), gamma-glutamyl-transferase (GGT) low-density lipoprotein (LDL)-cholesterol, high-density lipoprotein (HDL)-cholesterol, triglyceride (TG), cholesterol, high sensitivity C-reactive protein (HSCRP),uric acid and fasting blood glucose (FBG)were measured using

standard laboratory methods. Three days dietary recall was taken by registered dietician to evaluate their dietary intake. Average three days intake of calorie, protein, fat and carbohydrate were calculated by using Diet-Cal, software a tool for dietary assessment and planning (version-1).Their baseline calorie was compared with revised RDA calorie (recommended dietary allowances for Indians) released in 2010.[14] Lifestyle pattern: food habits and physical activity of participant's were examined with a self reported questionnaire which indicated the daily consumption of junk food especially soft drinks(coke, sprite, mountain dew, fanta, pepsi), french fries or fried chips and others(pizza, burger, noodles) over a week. The study protocol was approved by Institutional Ethics Committee (IEC), Post Graduate Institute of Medical Education and Research Chandigarh and informed consents were taken from their parents before assessment.

Statistical analysis; Statistical analysis was performed by SPSS version-16, Most of the variables were skewed and Mann-Whitney U test was applied for abnormal distribution of variables. All data were expressed in medians with interquartile ranges IQR in [square brackets] and minimum- maximum values were given in (round brackets) for biochemical parameters. Chi-square test was used for categorical data. Multinomial logistic regression analysis to assess variables associated with predictor of NAFLD i.e. soft drinks consumption, BMI Z- score, serum ALT, TG, uric acid (unadjusted) in obese children. Results were presented in odds ratio (OR), p value<0.05 was considered statistically significant.

RESULTS

Out of the 160 obese children, 106(66.2%) children were diagnosed with NAFLD. Among NAFLD children, 41(38.6%) had mild, 54(51%) had moderate and 11(10.4%) had severe form of NAFLD. There were no age difference in both the groups (p= 0.778). Z-BMI, MAC, TSF, WC were found higher in NAFLD children than without NAFLD (p<0.001) (Table1). Serum AST, ALT, GGT, FBG, TG (p<0.001) and HSCRP (p= 0.001), uric acid (p= 0.027) were found higher and HDL-c was lower in NAFLD group (p<0.001) as compared to those without it (Table 2). In multinomial logistic regression analysis, the most significant factors affecting NAFLD were TG (p<0.001) and Z-BMI 2, 3SD (standard deviation) (p =0.005, 0.004) (Table 3).

Daily consumption of soft drinks (60.4%), fried chips or french fries (58.5%) and others (30.2%) were higher in NAFLD group as compared to those without NAFLD i.e (37%), (38.9%) and (25.9%) over a week. NAFLD children were taking +310 kilocalories (kcal) and Non NAFLD group were taking +110 kcal more than RDA. The difference in energy intake was 200 kcal between the two groups. The energy intake in NAFLD and Non NAFLD group from fat and CHO was comparable i.e 32% vs. 31% from fat and 58.4% vs. 56.3% from CHO (Table 4). 85.5% children with NAFLD were physically inactive. These children were more inclined to playing video games, watching television or surfing on internet. The rest 14.5% does physical exercises (aerobics, jogging and sports) at least three times a week for 30 minutes. 58.2% of obese children without NAFLD were not doing physical activity and 41.8% children were physically active.

Table1. Baseline anthropometric parameters of obese children without and with NAFLD

Measurements	Without NAFLD(n= 54)	NAFLD (n= 106)	p value
Age (yrs)	12.2 [11-13.7]	12.5 [10-14]	0.778
Gender (Boys/Girls: n)	22/ 32	63/ 43	0.429
Weight (kg)	55 [52-60]	59.4 [53.6-66]	0.016

Cont... **Table1. Baseline anthropometric parameters of obese children without and with NAFLD**

Height (cm)	154 [145-158]	153 [137-158]	0.424
BMI (kg/m^2)	23.6 [22.8-25.9]	26 [24.5-29.7]	<0.001
BMI z score	2.05 [2.00-2.10]	2.36 [2.01-2.70]	<0.001
MAC (cm)	30 [28-31.2]	33 [32-35]	<0.001
TSF(mm)	17 [15-19.2]	20 [18-22]	<0.001
WC (cm)	83.5 [82-85]	86 [84-88]	<0.001

Table 2. Biochemical parameters of obese children with and without NAFLD

Measurements	**Without NAFLD(54)**	**NAFLD(106)**	**p value**
AST (IU/L)	31.5 [23.7-39] (19-42)	45 [43.7-51] (33-59)	<0.001
ALT (IU/L)	25 [23-27.8] (18-37)	46.5 [42.7-56.2] (32-70)	<0.001
GGT (IU/L)	20 [18-22] (15-29)	24 [23-29] (20-34)	<0.001
LDL-c (mg/dl)	97.7 [89.0-106.9] (83-116)	99 [91-112] (80-122)	0.081
HDL-c (mg/dl)	44 [42.0-46.2] (38-55)	42 [39-44] (32-49)	<0.001
Triglyceride (mg/dl)	140 [135-148] (107-151)	150 [148-154] (120-165)	<0.001
Cholesterol (mg/dl)	169.2 [164.1-176.3] (156.4-182.5)	171.7 [167-178] (145-187)	0.065
HSCRP (mg/L)	0.88 [0.78-1.00] (0.50-2.05)	2.10 [1.54-2.50] (0.87-3.20)	0.001

Cont... **Table 2. Biochemical parameters of obese children with and without NAFLD**

Uric acid (mg/dl)	4.60 [4.0-5.0] (3.40-6.00)	5.0 [4.3-5.9] (3.7-7.0)	0.027
Blood sugar fasting (mg/dl)	84.7 [79.7-90] (77-95)	94.5 [88-98.9] (78-106)	<0.001

Table 3. Variables associated with prediction of NAFLD in obese children

Variables	OR*	95% CI	p value
Uric Acid (mg/dl)	2.98	1.05- 8.45	0.04
Triglyceride (mg/dl)	30.68	6.31- 149.1	< 0.001
ALT (IU/L)	7.84	1.41- 43.4	0.018
BMI 2 SD **3 SD**	7.20 11.91	1.84- 28.1 2.23- 63.4	0.005 0.004
Soft Drink (daily consumption)	4.11	1.40- 12.0	0.010

OR*: Odds ratio, CI: confidence Interval, P<0.05

Table 4. Three day average dietary intake of obese children without NAFLD and with NAFLD

Nutrient Intake	Without NAFLD (n=54)	NAFLD (n= 106)	p value
RDA(2010) Energy (kcal)	2190	2190	
Energy (kcal)	2300 [2107-2500]	2500 [2417-2615]	<0.001
Protein (g)	64.5 [55-68]	63.5 [55-68]	0.968
Fat (g)	79 [77-87.2]	89 [86-93]	<0.001
Carbohydrates (g)	325 [289-357]	365 [328-400]	<0.001

DISCUSSION

In the present study, USG detected NAFLD in 66.2% of obese children. Previous studies reported that NAFLD was present in 44% to 75% of obese children and had high intake of junk food with physical inactiveness.[6, 15] Our study results indicate that high consumption of soft drinks and fried food are responsible for obesity and NAFLD. Their calorie intake increased due to visible or invisible sugars and fats present in junk food items that promotes lipid per oxidation, insulin resistance (IR), increase in advance glycation end products and hepatic inflammation.[16] Siddiqi et al. reported that students with NAFLD who were taking >2 soft drinks per day had significantly higher BMI, WC and also had elevated TG, FBG, ALT and lower HDL-c.[15] In present study,

daily soft drink consumption of NAFLD children was 60.4% and also had significantly higher Z-BMI, MAC, TSF, WC and elevated serum AST, ALT, GGT, TG, FBG, with lower HDL-c (Table1,2). Moreover uric acid was also significantly higher in NAFLD. Interestingly, in another study uric acid was the independent predictor of NAFLD in obese children and adults because of high fructose intake caused ATP depletion.[17] Excess visceral fat and free fatty acid accumulation in liver increases the production of HSCRP in NAFLD patients. NAFLD group had significantly higher HSCRP as compared to those without NAFLD (2.10 vs. 0.88, mg/L p= 0.001). In accordance with our findings, Kitsios et al. saw that obese and overweight children with NAFLD had significantly higher levels of HSCRP compared to without NAFLD (0.78 vs. 0.34 mg/dl, p= 0.016).[18]

In the current study, 10% obese children with NAFLD had higher FBG > 100mg/dl putting them at the risk of IR. In similar study, EI-Koofy et al. found that 73% of NAFLD children had IR with higher prevalence of metabolic syndrome and obesity including half of NAFLD children had higher ALT.[19] In our study, children who consumed soft drinks daily (1-2 standard glass) had 4.1 folds higher chances of NAFLD and its risk factors (Table 3). All obese children were taking more calories from fat and CHO rather than protein. In present study, observation about the physical activity in obese children with NAFLD was closely identical with previous study of Felix et al. [12]

This is the first study done on nutritional assessment in obese children with and without NAFLD in India.

CONCLUSION

Z-BMI, MAC, TSF, WC and ALT, AST, GGT, TG, FBG, HSCRP and uric acid are significantly higher in obese children with NAFLD and HDL-c is lower but most significant associated risk factors with NAFLD are TG and Z-BMI. Daily higher consumption of soft drinks with fried foods and sedentary lifestyle among obese children are major risk factor of NAFLD. Most of the calories they consumed from carbohydrate and fat that may play a role in the pathogenesis of NAFLD and its risk factors. Generally, untreated NAFLD in children will subsequently suffer full blown metabolic syndrome as they become young adults. Nutritional screening is the first step to identify the risk factors of NAFLD and lifestyle-based interventional approach could be defined before its occurrence.

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REFERENCES

1. Ranjani H, Mehreen TS, Pradeepa R et al. Epidemiology of childhood overweight & obesity in India: A systematic review. Indian J Med Res. 2016;143:160-174.
2. Song P, Yu J, Wang M, et al. Prevalence and Correlates of Suspected Nonalcoholic Fatty Liver Disease in Chinese Children. Int J Environ Res Public Health. 2017;14:465-75.
3. Anderson EL, Howe LD, Jones HE, et al. The Prevalence of Non-Alcoholic Fatty Liver Disease in Children and Adolescents: A Systematic Review and Meta-Analysis. PLoS One. 2015;24:281-8.
4. Schwimmer JB, Deutsch R, Kahen T, et al. Prevalence of fatty liver in children and adolescents. Pediatrics. 2006;118:1388-93.
5. Bellentani S, Scaglioni F,Marino M, et al. Epidemiology of non-alcoholic fatty liver disease. Dig Dis. 2010;28:155-61.
6. Sartorio A, Dell Col A, Agosti F, et al. Predictors of non-alcoholic fatty liver disease in obese children. Eur J Clin Nutr. 2007;61:877-83.
7. Ahn MB, Bae WR, Han KD et al. Association between serum alanine aminotransferase level and obesity indices in Korean adolescents. Korean J Pediatr. 2015;58:165-71.
8. Zelber-Sagi S, Ratziu V, Oren R, et al. Nutrition and physical activity in NAFLD: An overview of the epidemiological evidence. World J Gastroenterol. 2011;17:3377-89.
9. Assy N, Nasser G, Kamayse I, et al. Soft drink consumption linked with fatty liver in the absence of traditional risk factors. Can J Gastroenterol. 2008;22:811-6.
10. Pereira RM, Botezelli JD, da Cruz Rodrigues KC, et al. Fructose consumption in the development of obesity and the effects of different protocols

of physical exercise on the hepatic metabolism. Nutrients. 2017;9:405-26.

11. Elliott SS, Keim NL, Stern JS, et al. Fructose, weight gain and the insulin resistance syndrome. Am J Clin Nutr. 2002;76:911-22.
12. Félix DR, Costenaro F, Gottschall CB, et al. Non-alcoholic fatty liver disease (Nafld) in obese children- effect of refined carbohydrates in diet. BMC Pediatr. 2016;16:187-93.
13. Body Mass Index (BMI) for age Reference Data (5-19years) girls and boys, 2007 WHO Reference. http://www.who.int/growthref/who2007_bmi_for_age/en/.
14. Revised RDA for Indians 2010 - Nutrition foundation of India nutritionfoundationofindia.res.in/PPT-2011/Seven17-18teen/Dr-B-Sesikeran.pdf. Assesed Nov,15, 2010.
15. Siddiqi Z, Karoli R, Fatima J, et al. Soft drink consumption and the risk of nonalcoholic fatty liver disease. J Assoc Physicians India. 2017;65:28-32.
16. Nseir W, Nassar F, Assy N. Soft drinks consumption and nonalcoholic fatty liver disease. World J Gastroenterol. 2010;16:2579-88.
17. LonardoA, Loria P, Leonardi F, et al. Fasting insulin and uric acid levels but not indices of iron metabolism are independent predictors of non-alcoholic liver disease. A case control study. Dig Liver Dis. 2002;34:204-11.
18. Kitsios K, Papadopoulou M, Kosta K, et al. High-sensitivity C-reactive protein levels and metabolic disorders in obese and overweight children and adolescents. J Clin Res Pediatr Endocrinol. 2013;5:44-9.
19. El-Koofy NM, Anwar GM, El-Raziky MS et al. The association of metabolic syndrome, insulin resistance and non-alcoholic fatty liver disease in overweight/obese children. Saudi J Gastroenterol. 2012;18:44-9..

Impact of Noise on Hearing of Individuals Working in the Temples

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ABSTRACT

Introduction: One of the most mystifying problems faced by individuals who are exposed to high levels of noise (either occupational or recreational) is the slow deterioration of hearing that takes place. Evidence from the literature also indicates that noise exposure causes a significant sensory neural hearing loss. Hence we planned to compare the hearing of priests and workers of temples using Pure tone Audiometry and the fine spectral DPOAEs.

Method: Twenty three male participants between the ages of 20 to 65 years were included in the study. Group 1 participants worked in the temple premises for more than 5 years and all the individuals had reported to have been exposed to noise during work. Group 2 was not exposed to noise.

Results: The temple workers had poor thresholds and significantly reduced SNRs compared to the control group.

Conclusions: Temple noise has impact on individuals working in the temple premisespresence of NIHL among the

Keywords: - *NIHL, Temple Noise, hearing Loss*

INTRODUCTION

Slow deterioration of hearing that takes place in individuals who are exposed to high levels of noise (either occupational or recreational) is one of the most mystifying problems. Noise-induced hearing loss (NIHL) is the second most common form of sensorineural hearing loss, after presbycusis. The damage caused by the noise is imperceptible, painless, and enormously slow, that the individual is unaware of his loss of hearing for a long time, and hence it is the most pervasive of all the occupational health hazards. Noise exposure is perhaps the most common etiology of preventable hearing loss. Generally, this prolonged exposure to sounds as high as 85 dBA is hazardous even though the most important factor is the amount of sound exposure. Both the levels as well as the length of exposure are important and are interrelated [1-2].

The pathophysiology of the ear damage due to the noise exposure has been widely studied in humans and the mechanism whereby excessive sound exposure damages the ear is very well understood. Lesser levels of damaging sound exposure results in a TTS. If this TTS occurs regularly, there is a poor recovery resulting in a permanent threshold shift (PTS). This PTS occurs as a consequence of persistent exposure to such sounds resulting in some hair cells not able to recover from damage. The outer hair cells (OHCs) in the basilar part of the cochlea which is the area that responds to 4 kHz and also the adjacent areas of 3 and 6 kHz, are the first

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to fail permanently. This area of the ear is identified to be most sensitive, because of the harmonic amplification by the ear canal and also because of the absolute sensitivity. Once these hair cells start degenerating they are less likely to recover and a permanent hearing loss is expected. Characteristically thus, following a long duration of noise exposure, hearing loss is presented as an audiometric notch, which is usually greatest at 4 kHz but can also be anywhere between 3 kHz and 6 kHz. With higher noise exposure for prolonged duration, the loss starts extending to the neighbouring frequencies. Moreover, if the sound is intense, it produces a more severe pattern of TTS which may result is a PTS more rapidly [3].

Outer hair cells are more susceptible to noise exposure than inner hair cells. Noise exposure causing TTS is anatomically correlated with decreased stiffness of the stereocilia of outer hair cells. The stereocilia become disarrayed and floppy. Presumably, in such a state they respond poorly. These are associated with fusion of adjacent stereocilia and loss of stereocilia. With more severe exposure resulting in PTS, injury can proceed from a loss of adjacent supporting cells to complete disruption of the organ of Corti. Histopathologically, the primary site of injury appears to be the rootlets that connect the stereocilia to the top of the hair cell. With loss of stereocilia, hair cells die. Death of the sensory cells can progressively result in Wallerian degeneration and further loss of the primary auditory nerve fibres. Hence, it becomes important to study the effect noise exposure in individuals working in different areas as they are exposed to different types of noises, with similar pattern of cochlear loss [3].

NIHL has been studied extensively in various occupational groups and using various testing procedure [4-6]. Silva and Cabral studied the Noise Exposure Levels of Priests and Worshippers in Churches and found that the exposure level varied between 95.4 to 99.5 dBA which also poses risk to the worshipper, so they reported that hearing conservation programs with adequate acoustical sanitation measures must be implemented [7]. Nevertheless, the impact of noise in temples has not been studied, even though pujas (worships) in temples are usually associated with lot of noise. This includes sounds of drums, bells, people shouting prayers, the sounds from various instruments like Saxophone, Nadhaswara, Thaal, Dholki, Drums, etc. The temple workers and worshippers are thus exposed to sounds of high intensities (as high as 100 dB) and of a wide range of frequencies. Hence, these individuals could be prone to have hearing loss due to this kind of noise exposure. This makes it important for us audiologists to evaluate the level of hearing so that a good Hearing Conservation Program can be implemented.

Pure-tone audiometry has been a gold standard in evaluating the hearing status since decades based on which the Boyler's notch has been the most commonly reported pattern in NIH [8]. However OAEs are also gaining popularity due to the type of information it gives regarding outer hair cells (OHC) functioning, which is essential for a healthy hearing, but are most vulnerable part of the ear in response to noise. It is also commonly agreed that the onset and gradual development of NIHL is mainly a consequence of OHC loss [9]. The spectral changes in DPOAEs were employed in this study as DPOAEs identify the slightest changes in the cochlear function, and DPOAEs were reported to be more reliable than PTA, ideal for monitoring the cochlear functioning in those exposed to noise [10]. Hence, it was decided to carry out this present study using fine spectral changes in DPOAE in addition to the PTA and immitance measures

Need: NIHL is a more prevalent disorder among hearing disorders. Evidence from the literature also reports that noise exposure causes a significant sensory hearing loss. We hypothesised that noise exposure (due to exposure to sounds of drums, bells and other sounds) would have a negative impact on hearing health of individuals working in the temple premises throughout the day. Pharmacological line of management is not an effective choice in bringing the hearing back to normal level in individuals with NIHL. Hence, it is important to assess the hearing in this group, so that appropriate preventive measures may be advised either by using globalised hearing conservation programme or by other means like shifting of the work area away from noise.

Aim: To evaluate the hearing of priests and workers of temples using Pure tone Audiometry and the fine spectral changes in DPOAEs.

Subjects and Method

Participants: Twenty three male participants (Group 1: 9 workers from the temple and group 2:14 controls) between the ages of 20 to 65 years (mean age of group 1 and group 2 was 40.11 and 41.11 respectively) were included in the study. All the individuals in group 1

worked in the temple premises for more than 5 years and all the individuals had reported to have been exposed to noise during work. All participants did not have history of/presence of neurological problems, middle ear pathology or vestibular problems. In figure 1 hearing threshold of all the participants from each group across the octave frequencies are shown.

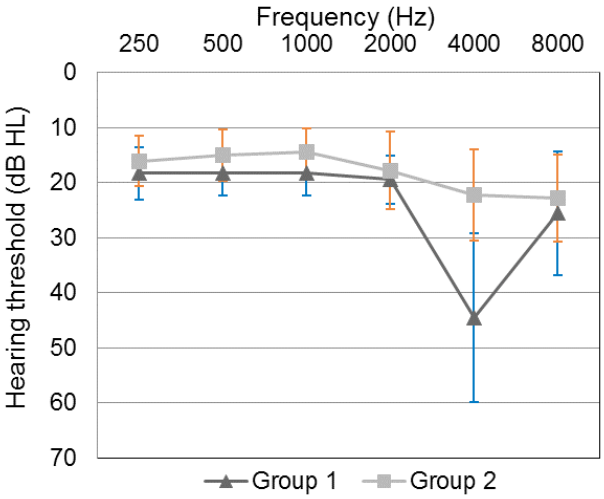

Figure 1: Shows PTA mean thresholds across the frequencies for all the participants.

Procedure: The participants were first seated in a sound treated audiometric laboratory. A brief case history was taken followed by an otoscopic evaluation. Immitance audiometry was conducted to rule out middle ear pathology because the transmission properties of the middle ear directly influence OAE characteristics. Then, pure tone audiometry using the instrument GSI 61 clinical audiometer was performed and audiometric thresholds were obtained at 250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz and 8 kHz for both ears. The pure tone average (average of thresholds obtained at 500 Hz, 1 kHz, 2 kHz & 4 kHz) for each participant was calculated for both ears. The participants were then evaluated using fine spectral changes in DPOAEs using a computer-based DPOAE analyser (GSI AUDERA). DPOAEs were recorded for a total 49 pairs of frequencies with a resolution of 12 points per octave between 1 kHz to 8 kHz. With f2:f1 ratio of 1.20 in all occasions and Intensities of f1 and f2 kept at 65/55 dB SPL [11]. In this study, data was represented with reference to f2 with rejection criterion set at 30 dB SPL or if L1 and L2 differed by > 2 dB from the target values beyond which a frame was rejected [12].

RESULTS

The frequency specific thresholds revealed that the temple workers had poor hearing thresholds indicating the presence of hearing loss. The DPOAE values showed that the SNRs were poorer in the Temple workers compared to the control group. The mean and standard deviations as shown in Table 1 were higher in the control group compared to the temple workers.

Table 1: showing the mean and standard deviation of the DPOAE Amplitude and SNRs at the four octaves.

Frequency in octaves	Temple Workers (dB)	Control Controls (dB)
	Mean & SD	Mean & SD
500 Hz – 1kHz signal amplitude	2.40 ± 3.33	2.72 ± 4.52
500 Hz – 1kHz SNR	8.92 ± 3.49	12.10 ± 6.37
1kHz – 2kHz signal amplitude	4.76 ± 5.60	7.19 ± 5.65
1kHz – 2kHz SNR	17.31 ± 5.94	23.51 ± 6.59
2kHz – 4kHz signal amplitude	-2.64 ± 7.61	3.02 ± 5.72
2kHz – 4kHz SNR	18.41 ± 7.92	26.52 ± 5.25
4kHz – 8kHz signal amplitude	-13.29 ± 6.30	-10.90 ± 6.34
4kHz – 8kHz SNR	7.98 ± 6.33	12.09 ± 5.81

On applying Mann Whitney U test for the values, a statistically significant difference was observed between the two groups which was specific to the octaves 1 kHz to 2 kHz, 2 kHz to 4 kHz and 4 kHz to 8 kHz at $p < 0.05$.

Pearson's product moment correlation was employed to observe the degree of correlation between the age, PTA and DPOAEs. The results revealed a good degree of positive correlation between Age and the PTA at $p = 0.004$, $r = 0.64$ which suggests that the PTA increased as age increased. It was also observed that there was a good degree of negative correlation between the age and the DPOAE values specific to the octaves 2kHz – 4kHz at $p = 0.00$, $r = -0.771$ and 4kHz – 8kHz at $p = 0.01$, $r = -0.712$ which indicates that as age increased the DPOAE SNRs at the higher octaves reduced. In addition, a good degree of negative correlation was observed between the PTA and the DPOAE SNRs between 2 kHz – 4 kHz octave at $p = 0.00$, $r = -0.771$.

DISCUSSION

This study aimed at investigating the hearing sensitivity among temple workers using PTA and DPOAE. The results showed that most of the Temple workers had pure tone thresholds higher than the normal limit with majority showing a notch at high frequencies between 3 - 6 kHz. This particular pattern is typical of the Boyler's notch observed in individuals with NIHL [8] which is attributed to the OHCs dysfunction which takes place maximally in this frequency region as a result of the harmonic amplification by the external ear and absolute hearing sensitivity, secondary to noise exposure [13].

The results also showed that the temple workers had lower DPOAE signals and SNRs at all the three octaves in comparison to the controls. This can be attributed to the impact of the temple noise on the hearing sensitivity of the individuals working in the temple leading to outer hair cell dysfunction indicative of Sensory-neural Hearing loss.

A significant positive correlation between Age and PTA was observed which suggested that older individuals working in the temple premises had higher thresholds which could be due to the longer years of exposure to the damaging noise leading to higher degree of hearing loss and also permanent threshold shifts. The age also showed a negative correlation with the DPOAEs at higher octaves indicative of the DPOAEs (at high frequencies 2 kHz to 4 kHz & 4 kHz to 8 kHz) reducing as the age advances. These particular findings could be attributed to an interaction of the noise induced hearing loss and age related loss. The noise induced hearing loss owing to years of exposure to loud noise which impacts the higher frequencies specifically, as well as age related loss of hearing sensitivity as a result of the deterioration in the structural aspects and functional metabolism of the inner ear. An influence of presbycusis on noise induced hearing loss has been suggested [13]. The effect of noise is hence equivocal. The interactions between NIHL and age related hearing loss are complicated, difficult to determine, and poorly understood [13]. Hence poorer pure tone thresholds and reduced DPOAE SNRs were obtained as age advanced.

The PTA also significantly correlated with the DPOAE SNRs specific to 2 kHz to 4 kHz which indicates more loss in those frequencies which is associated with the Boyler's notch, a typical characteristic of NIHL. This specific finding lessens the chances of age related hearing loss while supporting the presence of NIHL in this population. This in accordance with the findings that the outer hair cells (OHCs) in the most basilar part of the Cochlea are the first to get damaged permanently, the area that responds for sound frequencies between 3 and 6 kHz. This has been attributed to the absolute sensitivity as well as the harmonic amplification by the ear canal in response to the noise. Hence, after a long period of noise exposure, sensory neural hearing loss is presented as an audiometric notch, which is usually maximal at 4 kHz but may also range anywhere from 3 kHz to 6 kHz[3] at par with the observations in these temple workers. All these findings increase the possibility of NIHL in the individuals working in the temple premises, in line with the reports by the other researchers on the various populations [4-6]. The findings of this present study are also in coherence with the findings of the study done on individuals working in the churches who are reported to have hearing loss due to noise exposure [7]. This present study provides valuable insight about the effect of the damaging noise on the hearing in the individuals working in the temple premises. This may be helpful in understanding the impact of noise on the hearing of these individuals. The present findings stress the need to implement good preventable measures for individuals working in the temple premises.

CONCLUSION

These results could be attributed to the impact

of the temple noise on the hearing sensitivity of the individuals working in the temple leading to a Hearing loss, demonstrating the presence of NIHL among the individuals working in the temple premises. However study needs to be replicated using a larger sample for generalisation of finding.

Source of Funding- Self

Conflict of Interest - Nil

Ethical Clearance- Taken from Institutional Ethical Committee.

REFERENCES

1. Robinson DW. Noise exposure and hearing: A new look at the experimental data. Health & Safety Executive 1987.
2. Dobie RA. The relative contributions of occupational noise and aging in individual cases of hearing loss. Ear and hearing 1992; 13(1): 19-27.
3. Alberti PW. The anatomy and physiology of the ear and hearing. Occupational exposure to noise: Evaluation, prevention, and control 2001; 53-62.
4. Chen TJ, Chiang HC, & Chen SS. Effects of aircraft noise on hearing and auditory pathway function of airport employees. Journal of Occupational and Environmental Medicine 1992; 34 {6): 613-619.
5. Singh VK & Mehta AK. Prevalence of occupational noise induced hearing loss amongst traffic police personnel. Indian Journal of Otolaryngology and Head & Neck Surgery 1999; 51(2): 23-26.
6. Harmadji S & Kabullah H. Noise induced hearing loss in steel factory workers. Folia Medica Indonesiana 2004; 40(4): 171-174.
7. Silva LF & Cabral R. Noise exposure levels of priests and worshippers in protestant churches. International Journal of Occupational Safety and Ergonomics (JOSE) 2011; 17(1): 79-86.
8. McBride DI & Williams S. Audiometric notch as a sign of noise induced hearing loss. Occupational and environmental medicine 2001; 58(1): 46-51.
9. Saunders JC, Cohen YE, & Szymko YM. The structural and functional consequences of acoustic injury in the cochlea and peripheral auditory system: a five year update. The Journal of the Acoustical Society of America 1991; 90(1): 136-146.
10. Hall AJ & Lutman ME. Methods for early identification of noise-induced hearing loss. International Journal of Audiology1999; 38(5): 277-280.
11. Lonsbury-Martin BL, McCoy MJ, Whitehead ML, & Martin GK. Clinical testing of distortion-product otoacoustic emissions. Ear and hearing 1993; 14(1): 11-22.
12. Kim DO, Sun XM, Jung MD & Leonard G. A new method of measuring distortion product otoacoustic emissions using multiple tone pairs: study of human adults. Ear Hear 1997; 18: 277–285.
13. Rosenhall U. The influence of ageing on noise-induced hearing loss. Noise and Health 2003; 5(20): 47.

Effect of Sudarshankriya Yoga on Some Auditory Processing Abilities and Speech Perception in Noise among Middle Aged Adults

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ABSTRACT

BACKGROUND AND OBJECTIVES: Auditory transduction is the process by which sound is converted to neural impulses to pass via the auditory pathway structures to reach the auditory cortex and for above mention auditory physiology oxygenated blood supply is a necessity. SudarshanKriya Yoga (SKY) is known to improve lung functioning and oxygen level in blood circulation. Henceforth objectives of the present study was to compare the performance of modulation detection threshold, gap detection threshold, pitch discrimination threshold and speech perception in noise among middle aged adults who practice and do not practice SKY.

MATERIALS AND METHOD: Middle aged individuals who practiced SKY for a minimum of 1year were considered in the experimental group and who did not practices any form of yoga formed the control group. Auditory processing tests of modulation detection threshold, gap detection threshold and pitch discrimination threshold were assessed along with speech perception in noise.

RESULTS: The mean modulation detection threshold and SNR 50 scores showed no significant difference between the groups whereas the pitch discrimination and gap detection thresholds showed a significant difference between the groups.

CONCLUSION: SKY has a variable effect on the auditory processing abilities.

Keywords:- *SudarshanKriya Yoga, Auditory processing abilities, Speech in Noise*

INTRODUCTION

Perception and interpretation of auditory information is referred to as auditory processing. Temporal and spectral processing abilities are important aspects within the umbrella term of auditory processing. Speech perception is the process by which the sounds of language are heard, interpreted and understood. Decline in temporal processing has been correlated with reduced performance in speech recognition as well as longer gap to perceive the stop consonant within a word among middle aged adults in comparison to younger adults.[1,2] Sudden sensorineural hearing loss with slow blood flow in the vertebrobasilar system in humans has been reported.[3]

Auditory transduction is the process by which sound is converted to neural impulses to pass via the auditory pathway structures to reach the auditory cortex. Oxygenated blood supply is a necessity for this process to take place.[4] SudarshanKriya Yoga (SKY) is one of the popular forms of yoga practiced which

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involves cyclical controlled breathing practiced in four distinct consecutive segments separated by 30 second periods of normal breathing: Ujjayi – 3 cycles of slow breathing per minute; Bhastrika - 20-30 cycles of rapid exhalations per minute; Om chanting with prolonged expiration and SKY – slow, medium and fast cycles of rhythmic, cyclical breathing. Rhythmic breathing variations which is the last step of the SKY is practiced in the seated position with eyes shut and complete focus on the breath.[5,6] In short, SKY involves different kinds of pranayama along with rhythmic breathing practices. According to Ramdev [7], the outcome of pranayama practices is known to improve lung functioning and blood circulation. Research in the past has been able to explore the effects of SKY on cognition, oxygen saturation level, vital capacity, and other ailments. [5,8,9] However, there is a dearth of studies on the effect of SKY practices on human auditory behaviors. Henceforth we aim to assess the effect of SKY on some auditory processing abilities and speech perception in noise among middle aged adults.

MATERIALS AND METHOD

A total of 40 middle aged individuals in the age range 40-65 years participated in this research who were recruited by convenient sampling. 20 individuals comprised the experimental group (mean age=49 years, SD=±6.9) and 20 individuals formed the control group (mean age=51 years, SD=±5.5). All the individuals considered for the study had hearing thresholds within normal limits and were free of circulatory, neurological and renal issues. Any individual who scored less than 25 on the Mini-Mental State Examination (MMSE) was excluded from the study.[10] The experimental group consisted of individuals who practiced SKY for atleast 1 year and the control group did not practice any form of yoga. All the individuals for the study were native kannada speakers. All the stimuli for the psychophysical and speech perception tests were presented from a Dell Inspiron 14 64-bit laptop. The output from the laptop was routed through a Focusrite Scarlett solo sound card and the stimuli were presented through Sennheiser HD 280 headphones binaurally. The mlp (maximum likelihood procedure) toolbox using the MATLAB code was used for the temporal and spectral processing tests.[11] All the auditory processing tests employed a three alternative forced choice (3afc) paradigm using a 2-down 1-up staircase procedure.

Modulation detection threshold (MDT). Sinusoidal amplitude modulated 500ms Gaussian noise was presented at the rate of 8Hz, 20Hz and 60Hz. Modulated and unmodulated stimuli were equated for total RMS power. Noise stimuli had two 10msec raised cosine ramps at onset and offset. The MDT was based on the smallest level or depth of modulation that the participant identifies. The carrier was presented in three consecutive intervals separated by silent intervals of 200ms. In the randomly chosen interval, the carrier was sinusoidally amplitude modulated. The participant was asked to indicate if the modulation was present in the first, second, or third intervals. The starting level was reduced to -9dB for 8Hz modulation rate and -15dB for 20Hz and 60Hz respectively. The modulation depth was decreased by a factor of 3 for 2 consecutive responses and was increased by a factor of 1.5 for a single incorrect response. 12 reversals were measured from which the last 8 reversals were arithmetically averaged for threshold estimation. 3-4 practice trials were given before the commencement of the test.

Gap Detection Threshold (GDT). The standard stimulus used was a 750ms broadband noise with 0.5ms cosine ramps at the beginning and end of the gap which was presented for 500ms. Interstimulus interval was 1500ms. The variable stimuli contained the gap and the two standard stimuli did not contain any gap. The participants were instructed to indicate if the gap was present in the first, second or third interval. For two consecutive correct responses, the gap was reduced by a ratio of 2. Similarly, for a single incorrect response, the gap was increased a factor of 1.41421. The starting level of the gap duration was kept at 50ms. Similar to the modulation detection threshold procedure, the last 8 reversals from the 12 reversals were arithmetically averaged for threshold estimation.

Pitch Discrimination Threshold (PDT). 3 successive complex tones of 250ms were presented, which had the same power spectrum but differed only in pitch. The standard stimulus was a complex tone (F_0=330Hz) with 4 harmonics (lower harmonics, 2-5). The stimulus had 10ms cosine gated onsets and offsets. The starting level was set to a difference of 50Hz from the standard stimulus. A 2 down 1 up paradigm was used. The difference in pitch was decreased by a factor of 2 for successive two correct responses whereas the difference was increased by a ratio of 1.41421 for a single incorrect response. The participants were asked

to indicate whether the first, second or third interval had the higher pitch than the standard tone.

SNR 50. The QuickSin test in Kannada was used.[12] For the current study, three lists of sentences were presented at a comfortable level. The SNR (signal-to-noise ratio) was varied from +20dB to -10dB in 5dB steps per sentence in each list. The listener was asked to repeat the key words in the respective sentences. The number of correctly identified keywords from each list were calculated. Using the Spearman and Karber equation, total scores were converted to SNR 50 and averaged for 3 lists. The minimum signal to noise ratio at which one can repeat words 50% of the time is referred as SNR 50.

SNR 50= i + (1/2 * d) – (d *correct/ w),

Where, i = initial presentation level

d = step size

correct = number of keywords identified

w = number of keywords per decrease in SNR

Statistical Analysis.

Using SPSS 17 descriptive statistics was done to obtain the mean and standard deviation measures. Independent sample t-test was done to compare the mean thresholds for the auditory processing abilities and speech perception in noise scores between the groups. Correlation between years of SKY practice and auditory processing abilities and speech perception in noise was calculated using the Pearson's correlation coefficient.

RESULTS

Figure 1 shows the mean modulation detection threshold for both groups across the modulation rates. The mean threshold at the three modulation rates was almost alike in both groups.

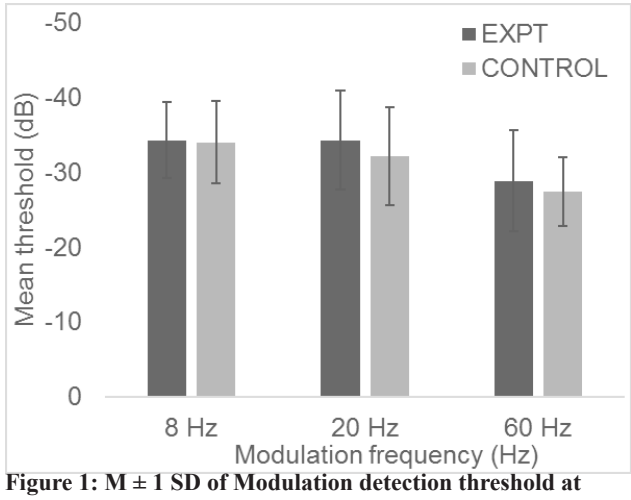

Figure 1: M ± 1 SD of Modulation detection threshold at 8Hz, 20Hz and 60Hz for the experimental and control groups (M-Mean, SD-Standard deviation)

Figure 2 shows the mean GDT scores for experimental and control groups. The mean gap detection thresholds for the experimental group was better than the control group and this difference was found to be statistically significant ($p \leq 0.05$).

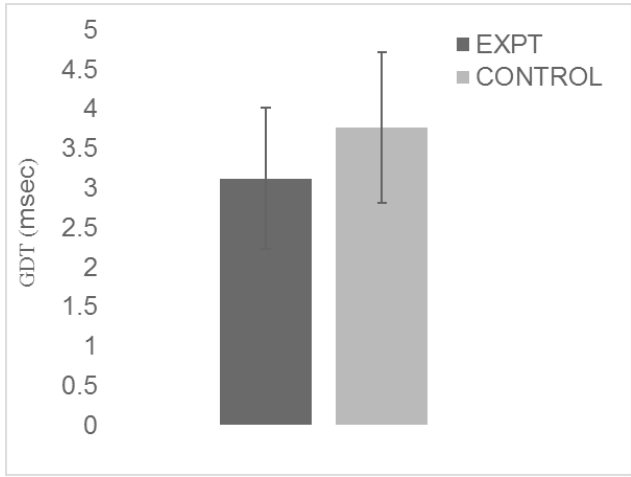

Figure 2: M ± 1 SD of GDT scores for experimental and control groups (M-Mean, SD-Standard deviation)

Figure 3 shows the mean PDT scores for experimental and control groups. The mean pitch discrimination thresholds was better in the experimental group which is suggestive of better discrimination abilities in the experimental group in comparison with the control group and this difference was statistically significant ($p \leq 0.05$).

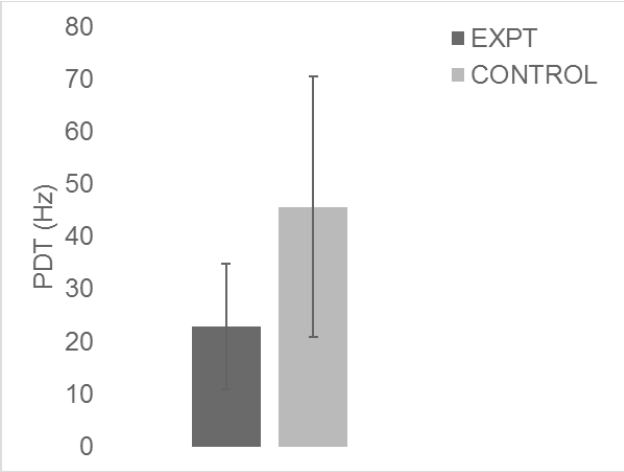

***Figure 3*: M ± 1 SD of PDT scores for experimental and control groups (M-Mean, SD-Standard deviation)**

Figure 4 shows mean SNR 50 scores for experimental and control groups. The mean SNR 50 scores was almost equivalent between both the groups.

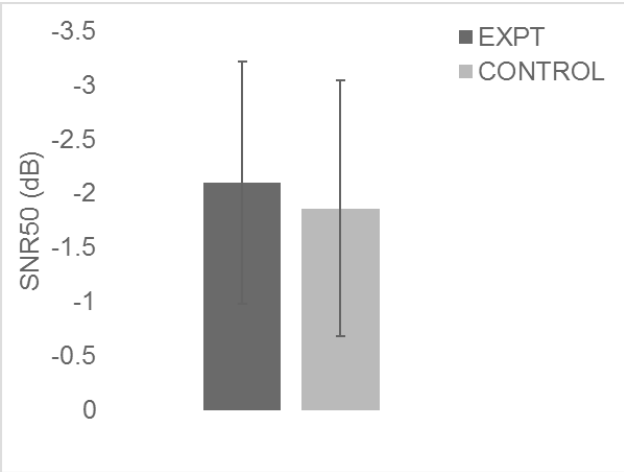

***Figure 4*: M ± 1 SD of SNR 50 scores for experimental and control groups (M-Mean, SD-Standard deviation)**

Independent samples t-test was done to compare the mean scores of modulation detection threshold, GDT, PDT, and SNR 50. Table 1 below depicts the F and p values of the independent t-test done to compare modulation detection threshold at the 3 modulation rates, GDT, PDT and SNR 50 between the experimental and control groups.

Table 1: F values and p values of independent t-test for modulation detection threshold (at modulation rates 8Hz, 20Hz, 60Hz), GDT, PDT and SNR 50

Parameters	F value	p value
MDT at 8Hz	0.051	0.79
MDT at 20Hz	0.02	0.35
MDT at 60Hz	5.76	0.54
GDT	0.06	0.04*
PDT	11.98	0.00*
SNR 50	1.95	0.53

The association between years of experience of SKY practice and the performance on the tasks was assessed using the Pearson correlation coefficient, controlling for age as a confounding variable. All the measures showed no significant correlations with years of experience of SKY practice. Table 2 represents the R values for the correlation studied between years of experience of SKY practice and modulation detection threshold (at 3 modulation rates), GDT, PDT and SNR 50.

Table 2*:* Correlation between years of practice and modulation detection threshold (at 8Hz, 20Hz, & 60Hz), GDT, PDT, and SNR 50

	Parameter	Correlation coefficient
Years of SKY practice	MDT at 8Hz	0.35
	MDT at 20Hz	0.05
	MDT at 60Hz	0.16
	GDT	0.39
	PDT	0.01
	SNR 50	-0.05

DISCUSSION

SKY practice showed no significant effect on MDT which can be attributed to unknown reasons. Contrary to our study improved blood circulation due to physical exercise resulted in better modulation detection abilities for lower carrier frequency (500Hz) at three modulation rates (16Hz, 32Hz and 64Hz) except for 8Hz modulation rate has been reported, in old aged adults who engaged in physical exercise compared to age matched peers

who did not engage in any form of physical exercise. However, no significant difference for higher frequency carrier tone (4000Hz) across the modulation rates was reported among old aged adults practicing physical exercises.[13]

GDT in the group of participants who practiced SKY showed significant improvement compared to the group of participants who did not practice SKY. This improvement can be attributed to improved oxygenated blood supply to the auditory system due to SKY practice. However, there is no literature available affirming improvement on auditory processing measures in effect to SKY practices. Temporal envelope processing those assessed through MDT and GDT, the findings from these measures are not comparable due to the within subject variability observed for these measures.[14]

Pitch discrimination was measured for a 330Hz fundamental frequency tone with lower harmonics (2 to 5 harmonics). The better performance on pitch discrimination abilities in the middle aged participants who practiced SKY could be attributed to better TFS coding due to improved oxygenated blood supply to the auditory system due to SKY practice. A high degree of variability was observed in pitch discrimination abilities between the participants and this finding is in accordance with literature. [15, 16]

SNR 50 which is a measure of speech perception in noise, was almost identical between both the groups. There is no available literature to support the current finding. Pitch discrimination of a complex tone with lower harmonics and speech perception in noise both make use of temporal fine structure processing. However, there are various other factors which are important for speech perception in noise. Understanding speech in noise depends on fundamental frequency and other acoustic features such as formants, fine structure, etc. has been reported.[17] In the present study, the fundamental frequency of the QuickSin sentences (F= 233Hz) was lower than the fundamental frequency of the complex tone stimuli (F= 330Hz) used in the pitch discrimination task. So the findings from these two measures cannot be compared with each other.

The years of SKY practice failed to show any correlation with the performance on the auditory processing and speech perception in noise abilities. All the participants considered in the research had a minimum of 1 year of experience in SKY practice. Probably, the improvement in auditory measures due to improved oxygenated blood circulation would have already taken place which maintained as the years of experience increased. Similar findings have also been reported among participants practicing meditation.[18]

CONCLUSION

From the present study, it can be implied that SKY practice has a beneficial effect on some aspects of auditory processing abilities. This can pave way for an alternative strategy to offset the decline in auditory processes and maintain a healthy auditory system.

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REFERENCES

1. Helfer KS, Vargo M. Speech Recognition and Temporal Processing in Middle-Aged Women. J Am Acad Audiol. 2009;20(4):264–71.
2. Grose JH, Hall JW, Buss E. Temporal processing deficits in the pre-senescent auditory system. J Acoust Soc Am [Internet]. 2006 Apr;119(4):2305–15.
3. Yamasoba T, Kikuchi S, Higo R, O'uchi T, Tokumaru A. Sudden sensorineural hearing loss associated with slow blood flow of the vertebrobasilar system. Ann Otol Rhinol Laryngol [Internet]. 1993 Nov;102(11):873–7.
4. Gates GA, Mills JH. Presbycusis. Lancet (London, England) [Internet]. 2005;366(9491):1111–20.
5. Brown R, Gerbarg P. Yogic breathing and meditation: When the thalamus quiets the cortex and rouses the limbic system. Int Symp "Science Breath" 2002;11–9.
6. Zope S, Zope R. Sudarshan kriya yoga: Breathing for health. Int J Yoga [Internet]. 2013 Jan;6(1):4–10.
7. Ramdev S. Pranayama Rahasya. Divya Prakshan, Divya Yog Mandir; 2009.
8. Sayyed A, Patil J, Chavan V, Patil S, Charugulla S, Sontakke A, et al. Study of Lipid Profile and Pulmonary Functions in Subjects Participated

in Sudarshan Kriya Yoga. Al Ameen J Med Sci. 2010;3(1):42–9.

9. Mandanmohan, Jatiya L, Udupa K, Bhavanani AB. Effect of yoga training on handgrip, respiratory pressures and pulmonary function. Indian J Physiol Pharmacol [Internet]. 2003 Oct;47(4):387–92.
10. Folstein MF, Folstein SE, McHugh PR. "Mini-mental state". A practical method for grading the cognitive state of patients for the clinician. J Psychiatr Res [Internet]. 1975 Nov [cited 2017 Jun 9];12(3):189–98.
11. Grassi M, Soranzo A. MLP: a MATLAB toolbox for rapid and reliable auditory threshold estimation. Behav Res Methods. 2009;41(1):20–8.
12. Avinash MC, Meti RR, Kumar A. Developement of Sentences for Quick Speech-In-Noise (Quick SIN) Test in Kannada. J Indian Speech Hear Assoc. 2009;24(1):59–65.
13. Manjunath D, Theruvan NB, Bhat JS, Pitchai Muthu AN. Effect of Age and Physical Exercise on amplitude modulation detection thresholds. Int J Pharmocology Bio Sci. 2016;7(4):467–72.
14. Formby C, Muir K. Modulation and gap detection for broadband and filtered noise signals. J Acoust Soc Am [Internet]. 1988 Aug;84(2):545–50.
15. Jesteadt W, Sims SL. Decision processes in frequency discrimination. J Acoust Soc Am [Internet]. 1975 May;57(5):1161–8.
16. Jesteadt W, Bilger RC. Intensity and frequency discrimination in one- and two-interval paradigms. J Acoust Soc Am [Internet]. 1974 Jun;55(6):1266–76.
17. Song JH, Skoe E, Banai K, Kraus N. Perception of Speech in Noise: Neural Correlates. J Cogn Neurosci. 2011;23(9):2268–79.
18. Kumar UA, Sangamanatha a. V, Vikas J. Effects of Meditation on Temporal Processing and Speech Perceptual Skills in Younger and Older Adults. Asian J Neurosci [Internet]. 2013;2013(September):867–78.

Influence of Family Structure and Gender on Oral Health Behavioral Characteristics in Siblings, a Narrative Review

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ABSTRACT

Aim: To comprehensively address the concerns regarding the influence of family structure and gender on sibling oral health behavioral characteristics.

Background: The maintenance of one's oral health is influenced by the behavioral characteristics and structure of a family, parental attitudes, presence or absence of siblings, paternal and maternal behavior and the gender of the child. The intricate, subtle and sensitive directives a child's mind perceives and receives on a daily basis within the home environment plays a vital role in determining the mind set of a child in relation to oral health.

Clinical significance: Psychology, Psychiatry, Sociology, Developmental Physiology, Sibling behavior patterns and background family factors are key related fields in the formative years which guide us for a comprehensive understanding. Comprehending the intricately networked branches of behavioral sciences and sibling behavior helps us to refine our response to patients, for improved oral health counsel and advise.

Conclusion: Adoption of the best practices for improving oral health related interaction at home and for bringing about a sensitive and constructive approach in the mindset of siblings contribute to improved health outcomes.

Keywords *: family, gender, oral health*

INTRODUCTION

It is known that a family environment does play a role on the health and oral health of a child . What needs to be further explored is the role of family, gender differences and the influence of sibling behavior on oral health. This narrative review attempts to throw light on the family structure, parental, paternal, maternal and related perspectives of gender, age and adolescence.

It has been established that the mother is of the utmost influence when it comes to the oral health of the child, however there are some variables which are not well explored.

Parents' oral health habits have a direct influence on the children, and this has been documented to be slightly stronger in sons, when compared to daughters. Among girls, the father's high occupational level influences oral health for the better[1], a possible explanation which could be awareness and access to better facilities and care. A lesser known dynamic of families is the gender tilt, as illustrated by Milevksy. Families with a male tilt i.e families with more males in the home, have reported higher levels of family hostility and lower levels of family satisfaction than female-tilted families[2]. This patriarchal influence has been shown to have an indirect

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correlation with oral health and dental injuries. Sanders et al attempted to understand this by scrutinizing various parental rearing styles and the stress experienced by adolescents, which increases their likelihood to sustain dental injuries and poor periodontal/gingival health. Adults who described their rearing as unsupportive, reported lower levels of control, life satisfaction, and greater stress [3] which would then increase their predisposition to poor oral and general health. Parental co-habitation was not seen to have a significant association with the adult's psychosocial profile. Sole parent status may not disadvantage the child's psychosocial development in the event that the parent provides a sense of security (provided the socioeconomic profile is adequate) when compared to children in two parent households who are exposed to conflict[3]. More experienced and more educated parents have been expected to exhibit a higher awareness when it comes to oral health, but no correlation exists between parental age/level of education and compliance of children in specific issues when asked to use a mouthguard in a study conducted by Matalon V et al [4].

Family size is yet another influencing variable which directly impacts the division of labor and finances which go towards attaining education and maintaining good oral health. Smaller families have more effective communication and are able to monetarily concentrate on each member including the children, owing to greater nurturing, education/awareness, access to dental treatment and dental aids. In a larger family, additional effort must be invested in order to maintain smooth daily functioning, and such families have more diversified roles as well as less likelihood of conflict [2] despite the need to cut down on expenses at the cost of poorer attention to dental health, owing to higher caries rates [5].

Studies on birth order and sibling relationships have consistently found that elder siblings in the family often take on a semi-parental role by offering support, advice, and mentorship to the younger child. Consequently, younger siblings admire and venerate their older siblings [2]. It has been shown that the eldest children bear the burden in cases of a chronically ill sibling, thus lowering their educational attainment- while the younger siblings are insulated. **Having a brother works in favor of this insulation from negative impacts of household hospitalizations [6].** The study of gender differences in children and siblings in regard to general and oral health has showcased some interesting findings. A study in older unlike sex twins showed females to have more total health conditions, most of which were not life threatening, whereas males had lesser health conditions though most were life threatening [7]. As per the general consensus over the years, females have been shown to have a greater awareness and concern for their dental health which is concurrent with the rates of decline in dental visits during the transition from childhood to adulthood, the risk being more in males as described by Brocklehurst P [8]. This is further illustrated by more frequent toothbrushing habits in girls across all age groups, countries and regions. Due to certain baseless societal norms, girls in the past have grown to be more conscious of their physical appearance when compared to boys. This assumption is concurrent with findings from a study conducted by Matalon et al, which showed a higher compliance to wearing mouthguards in boys, and a significantly lower compliance with girls [4]. It showed that the reason for the difference was not entirely clear but it was not a result of societal standards of beauty, but in fact due to how individuals view areas for beauty.[10]. A survey conducted in Hiroshima University, Japan has shown that the average number of teeth present in those over 75 years of age, were more in males than in females[11].

Gender, however is not the only factor influencing oral health compliance behaviors. A study by Mak KK in Hong Kong, showed that the male gender as well as Chinese background are significantly associated with lower odds of regular toothbrushing, annual dental visits and use of dental floss [12.]

Sibling relationships are impacted by their gender composition, dyads of brothers have been found to be more aggressive and hostile rather than the supportive and intimate and nurturing relationship shared by sisters [2]. Mixed sex dyads as well as brothers have been repeatedly shown to harbor less supportive and less intimate relationships than sister dyads.

Sister dyads have displayed increasing closeness at the age of adolescence with more reciprocal advice and trust than the other dyad combinations, owing to higher sibling relationship satisfaction when compared to males. Mixed sex dyads can be assumed to show a higher propensity for conflict. Literature highlights more harmony between same sex dyads, more so in sister dyads leading to the further assumption that **gender does impact the quality of sibling relationships**

and behaviors. However, mixed sex dyads have been shown to develop a closeness during the age of middle adolescence, more than the same sex dyad siblings. Kim et al have proposed that this could be perhaps due to a developing desire to learn about the opposite gender in the beginning of early romantic relationships at this age[2].

Caregivers/ Teachers oral health attitudes and their effect on siblings :

At a young age, children mostly interact with their parents/siblings/other caregivers at home, and teachers in school. A large portion of oral health practices acquired by the child are imparted by the school teachers which are then passed on to their siblings at home. An excellent example of this in Japan, is by the prevalence of Yogo Teachers who are equivalent to school nurses and care for the child by promoting health. Certification for the same can be procured in the field of dentistry and oral health and is existing in many institutes such as Hiroshima University, Baika Women's university, Kyushu University of Nursing and Social Welfare etc. Caregivers with a positive attitude towards oral health such as frequent visits to the dentist, use of fluoride varnish etc, would no doubt extend these behaviors and attitudes to the children they care for[13,15,16] and such children would be more aware and display better oral care patterns which their siblings would try to emulate. Most of the participants in school based studies, to evaluate oral health attitudes of school teachers, have been female staff [15,16,17] They have shown better oral hygiene scores as well as awareness, most of the knowledge being received from their dentists, followed by books and then television [13]. Since school teachers are teaching children about oral hygiene maintenance, they themselves must be well versed with the principles and techniques of oral care. It has been shown that nearly 80% teachers use potentially traumatic techniques for interdental cleaning, many do not regularly visit the dentist, and eat high amounts of refined sugar [18]. It would be detrimental if they were to pass on this information to children, and it can be prevented by carrying out organized training to demonstrate proper use of tooth cleansing aids to strengthen their oral health knowledge. This would likely be a success due to the positive attitudes towards oral health education exhibited by primary school teachers [16,17] especially towards learning more about dental trauma management[19]. Two potential paths which the siblings may be led down are worth discussing here. One situation would be one where one sibling attempts to emulate what the other has learned from his/her teacher, and the other could be that the sibling tries to defy the same. In both these scenarios the impact on the sibling's oral health would largely depend on what the child has been taught at school, and if accurate dental care methods are expressed. Further, two or more siblings, learning from two different teachers at school, may be taught differently and upon discussion and comparison, the siblings could help improvise on each other's oral behaviors thus developing an oral care pattern which is a combination of two, or bettered version of one.

Media and sibling behavior :

The only inanimate entity a child learns from at this age is various forms of media, be it advertisements in magazines, posters and television. Thus it is crucial what a child watches on television, whether it is their favorite programs or the advertisements in between. The information children gain from watching programs on television are then transmitted to their friends and siblings who often watch with them. An interesting study by Rodd and Patel, described the nature of television advertisements and their effects on pediatric viewers. In this study, over a 2 month period, 984 ads were transmitted, out of which on average 24 adverts were shown per hour of children's television broadcasting. Shockingly among the 41 hours of recording, there was seen to be only one advertisement for an oral hygiene product, and nearly 95% of ads were centered on high sugar and/or acid products. Children are being overwhelmed with harmful information via TV advertisements and being targeted for the marketing of these harmful products [20] which has an impact on sibling attitudes towards oral health. A positive outcome that can come from tweaking these advertisements is through motivational interviewing which is shown to benefit siblings and adolescents in particular[21]. Creative exploration of bringing about such positive outcomes is illustrated by an app called Toothsavers which has a virtual brushing game for children with instructions, available in English and Spanish. The use of such a modality has shown to impact children as well as sibling behavior, and leads to regular twice daily brushing within a year of use[22].

CONCLUSION

The major influencer in learning of oral behaviors is the mother followed by one's siblings. The impact is far more with the elder sibling in a family with multiple

children. Children learn a majority of their behaviors including sleep habits, oral hygiene habits such as tooth brushing, from their parents but even more so from their elder siblings in an attempt to emulate their behavior and gain parental approval. This is concordant with modeling.

The presence of siblings in a child's life has intangible benefits owing to superior emotional maturity, closer friendships, healthier competition, **preemptive support** and higher fulfillment when compared to those without siblings. Modeling is successfully used in the dental clinic to alleviate dental anxiety in a child with the help of a sibling model who then encourages positive and cooperative behavior from the previously anxious child.

Closeness between siblings is influenced by the gender of the children, of which sister dyads have the closest and healthiest relationship, and the older brother-younger sister pair are the least intimate. Female tilted families (with more female members) display more harmony and less hostility, and aggression than male tilted families. This is more conducive in acquiring and maintaining health behaviors.

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REFERENCES

1. Poutanen R, Lahti S, Tolvanen M, Hausen H. "Gender differences in child-related and parent-related determinants of oral health-related lifestyle among 11- to 12-year-old Finnish school children" Acta Odontol Scand 2007 Jan 1;65(4):194–200. http://dx.doi.org/10.1080/00016350701308356 Accessed 6th October 2017
2. Avidan M. Sibling Issues in Therapy: Research and Practice with Children, Adolescents and Adults 1st ed. 2016. 1st Edition. Kristine Hernandez, editor. Palgrave Macmillan; 2016. 208 p. https://www.amazon.in/Sibling-Issues-Therapy-Research-Adolescents-ebook/dp/B017KUOJHM Accessed 2nd November 2017
3. Sanders AE, Spencer AJ. "Childhood circumstances, psychosocial factors and the social impact of adult oral health" Community Dent Oral Epidemiol 2005 Oct 1;33(5):370–7. http://dx.doi.org/10.1111/j.1600-0528.2005.00237.x Accessed 28th September 2017
4. Matalon V, Brin I, Moskovitz M, Ram D. "Compliance of children and youngsters in the use of mouthguards". Dent Traumatol. 2008;24(4):462–7. https://doi.org/10.1111/j.1600-9657.2008.00600.x Accessed 10th October 2017
5. Folayan MO, Kolawole KA, Oziegbe EO, Oyedele TA, Agbaje HO, Onjejaka NK, Oshomoji VO. "Association between family structure and oral health of children with mixed dentition in suburban Nigeria" J Indian Soc Pedod Prev Dent 2017;35:134-42. http://www.jisppd.com/text.asp?2017/35/2/134/206034. Accessed 28th August 2017
6. Johnson E, Reynolds CL. "The effect of household hospitalizations on the educational attainment of youth". Econ Educ Rev 2013;37(Supplement C):165–82. http://www.sciencedirect.com/science/article/pii/S0272775713001271 Accessed 13th October 2017
7. Gold CH, Malmberg B, McClearn GE, Pedersen NL, Berg S. "Gender and Health:A Study of Older Unlike-Sex Twins". Journals Gerontol Ser B 2002 May 1;57(3):S168–76. http://dx.doi.org/10.1093/geronb/57.3.S168. Accessed 28th October 2017
8. Brocklehurst P. "Summary of: Changes in dental health investment across the adolescent years" Br Dent J 2012 May 12;212(9):438-9. https://doi.org/10.1038/sj.bdj.2012.372 Accessed 13th November 2017
9. Honkala S, Vereecken C, Niclasen B, Honkala E. Trends in toothbrushing in 20 countries or regions between 1994 and 2010. Eur J Public Health 2015;25(Suppl. 2):20–3.
10. Al-Kharboush GH, Asimakopoulou K, AlJabaa AH, Newton JT. "The role of social comparison in social judgments of dental appearance: An experimental study". J Dent 2017;61(Supplement C):33–8. http://www.sciencedirect.com/science/article/pii/S0300571217300775 Accessed 20th October 2017
11. Sasahara, Sugiyama, "Survey on Dental Diseases" Archives, Hiroshima University, 2016
12. Mak KK, Day JR. "Dental health behaviours among early adolescents in Hong Kong" Int J Dent Hygiene9, 2011; 122–126 http://dx.doi.org/10.1111/j.1601-5037.2010.00452.x Accessed 20th November

2017

13. Liu H-Y, Chen J-R, Hsiao S-Y, Huang S-T. "Caregivers' oral health knowledge, attitude and behavior toward their children with disabilities". J Dent Sci 2017;12(4):388-395 https://doi.org/10.1016/j.jds.2017.05.003 Accessed 14th October 2017
14. Fernando S, Kanthi RDFC, Johnson NW. "Preschool teachers as agents of oral health promotion: an intervention study in Sri Lanka". Community Dent Health 2013 Sep;30(3):173—177. http://europepmc.org/abstract/MED/24151792 Accessed 23rd November 2017
15. Divaris K, Lee JY, Baker AD, Gizlice Z, Rozier RG, DeWalt DA, Van Jr WF. "Influence of Caregivers and Children's Entry Into the Dental Care System". J Pediatrics 2014 May 7;133(5):e1268–76.
16. HV A, D'Cruz AM, Shirahatti RV. "Knowledge, attitude and practice regarding oral health among the rural government primary school teachers of Mangalore, India". J Dent Hyg. 2013 Dec;87(6):362-9
17. Mwangosi IEAT, Nyandindi U. "Oral health related knowledge, behaviours, attitude and self-assessed status of primary school teachers in Tanzania". Int Dent J 2002 Jun 1;52(3):130–6. http://dx.doi.org/10.1111/j.1875-595X.2002.tb00617.x Accessed 17th November 2017
18. Ehizele A, Chiwuzie J, Ofili A. "Oral health knowledge, attitude and practices among Nigerian primary school teachers". Int J Dent Hyg 2011 Nov 1;9(4):254–60. http://dx.doi.org/10.1111/j.1601-5037.2010.00498.x Accessed 23rd November 2017
19. Al-Jundi SH, Al-Waeili H, Khairalah K. "Knowledge and attitude of Jordanian school health teachers with regards to emergency management of dental trauma". Dent Traumatol 2005 Aug 1;21(4):183–7. http://dx.doi.org/10.1111/j.1600-9657.2005.00307.x Accessed 21st October 2017 https://www.ncbi.nlm.nih.gov/pubmed/24357565 Accessed 19th November 2017
20. Rodd HD, Patel V. "Content analysis of children's television advertising in relation to dental health". Br Dent J 2005 Dec 10;199(11):710–2. Available from: http://dx.doi.org/10.1038/sj.bdj.4812967 Accessed 27th November 2017
21. Gholami M, Pakdaman A, Montazeri A, Virtanen JI. "Evaluation of the impact of a mass media campaign on periodontal knowledge among Iranian adults: A three-month follow-up". PLoS One. 2017;12(1):1–13. https://doi.org/10.1371/journal.pone.0169668 Accessed 19th September 2017
22. Children's Oral Health (2013) AdCouncil. Pages 2-5 https://www.adcouncil.org/Impact/Case-Studies/Children-s-Oral-Health-2013 Accessed 17th September 2017

Comparison of the Influence of Different Tooth Tapers on Retention of Metal Crowns Luted with Two Resin Cements

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ABSTRACT

Background: Taper of the prepared tooth is one of the most important factor for retention while luting cements are weak but a critical link for retention

Aims: Compare the influence of different tapers of prepared teeth on retention of metal crowns when luted with two commercially available adhesive resin cements

Materials and Method: 48 extracted human premolars were used in this study. Each tooth was mounted in a PVC ring with auto polymerizing acrylic resin. A customized device was used to standardize the tooth preparation. Teeth were divided into 3 equal groups representing taper 6º, 12º, and 30 º. Metal crowns were fabricated for each tooth. Prepared teeth were luted with either RelyX Ultimate Clicker or Multilink Automix .Specimens were subjected to 'Crown Pull Off' test using Universal Testing Machine

Statistical analysis used: One way ANOVA with Tukey post-hoc and Independent 't' test

Results: Statistically significant difference was found in the mean failure stress at 6º degree taper angle compared to 30º with p value ≥ 0.003 for both the adhesive resin cements. There was no significant difference of mean of failure stress for metal crowns luted with RelyX Ultimate Clicker and Multilink Automix

Conclusions: Mean failure stress was highest at taper at 6º with a steady decrease at 12º and significant decrease at 30º taper It is utmost important for clinician to prepare the tooth within the range of 12º taper. While adhesive resin cements RelyX Ultimate and Multilink Automix are equally effective in terms of retention of the crowns

Key-words: *Crown retention, Failure stress, Luting agent, Resin cements.*

INTRODUCTION

Tooth preparation is an art and requires lot of skill and planning and is governed by biological, mechanical and esthetic principles. A prepared tooth should receive a crown in such a manner that it should restore the function in harmony with adjacent soft and hard tissues.

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Retention is one of the most important mechanical principle of tooth preparation. It is the quality of prepared tooth that prevents the restoration from being dislodged by forces acting parallel to the path of placement.[1]

Taper is defined as the convergence of the two opposing external walls of as tooth preparation viewed in a given plane. Recommended taper is 6 degrees.[1]Although in practice various studies have shown dentists to produce taper angles ranged between 12.2 to 27 degrees.[2]

On the other hand luting cement is a weak but a critical link for retention of an indirect restoration. Function of luting cement is to 1) fill the space between

the crown and the prepared tooth; 2) provide retention resisting dislodgement; and 3) provide good aesthetical conditions for the indirect restoration.[3,4,5].

Luting cements consists of two types[6]

1. Conventional water based luting cements

2. Anhydrous or polymerizing cements

Polymerizing cements are usually composite resins in conjugation with adhesive or self-adhesive systems. Self-adhesive systems are now been popular due to ease in manipulation but show less bond strength than cements with additional adhesive systems. On the other hand method of curing also plays important role. Self-cured cements shows less bond strength than light cured cements.[7] This is especially true for metal crowns where light curing is not an option due to the opacity of the metal. Adhesive resin cement retention can be enhanced by using a bonding agent in such cases. The adhesive properties consists of both, the bond to the prepared tooth as well as bond to the indirect material that covers the tooth.

Present study determines the effect of tapers 6°, 12° and 30° on metal crowns luted with two commercially available cements adhesive resin cements Multilink Automix (Ivoclar Vivadent) and Rely X Ultimate Clicker (3M ESPE) . It also compares retentive ability of two adhesive resin cements.

MATERIALS AND METHOD

Specimen preparation

48 freshly extracted human pre molar teeth were collected. Roots of each tooth were notched with grooves for added retention. Autopolymerizing acrylic resin was mixed in thin consistency and poured in PVC ring of 2.5 inch height and 1 inch diameter. Each tooth was embedded in acrylic resin in the PVC ring by centering it in the ring and covering the root until 2 mm apical from cement enamel junction.(Fig 1) PVC ring was held firmly on a surveyor base with a cast holder and complete crown preparations were done using a high speed hand piece which was stabilized by a specially fabricated customized holding device(Fig 1) that can be moved around a rotational axis to obtain the desired degree of taper for the preparation.

Figure 1. Mounting of extracted premolar with acrylic in PVC Ring

Figure 2. Tooth preparation with customized device

Straight diamond points with a rounded tip were used to prepare axial surfaces and to establish a chamfer finish line. With the hand piece rigidly secured, the axial surface was prepared by rotating the surveyor base against the diamond point. (Fig 2) Occlusal surface of the teeth were made flat, parallel to the floor and Occlusocervical dimension (h) of the teeth were standardized at 3 mm for all the specimens according to study done by Sekar et al.[8] The crown preparation with different tapers 6, 12, 30 degrees respectively were achieved by tilting then

hand piece to their respective degree. (Fig 2) Angulation of each specimen was verified by using tool room microscope.

The prepared tooth was considered as truncated cone for surface area calculations. Zidan et al [9] used a mathematical formula for calculation of surface area.

D= diameter of the base of conical frustum

d= diameter of the apex of conical frustum

h= axial height

A1= the conical surface of the frustum of a right cone

A2= Surface area of top of frustum

The surface area A = A1 + A2

A1 = π (r1+ r2) [h 2(r1 - r2)2]½ where r1=D/2, r2 = d/2, and A2 the surface area of the top of frustum was calculated according to the following equation: A2 = π(r2)2. Impressions of all the specimens were made with 2 step technique with polyvinyl siloxane putty and light body (Flexceed).

All the impressions were poured in type IV stone or die stone (Pearlstone) .Wax patterns were made in form of uniform copings with type 2 inlay wax (Starwax).with loop on the occlusal surface to facilitate crown pull off test. Copings were then invested with phosphate bonded investment material (Bellasun). Casting was done using nickel chromium metal pellets (Wiron 99) in a centrifugal casting machine (Bego). 48 Specimens were divided into 24 (6, 12, 30 degrees) each for cementation with either Multilink Automix or RelyX Ultimate Clicker. All the specimens were then kept in water for 7 days before testing. On 8th day the samples were subjected to testing. Samples were connected to universal testing machine with the help of U shape orthodontic wire passing through the loop of the cemented crowns. Crowns were subjected to pull off test with a crosshead speed of 1mm/min

The force of removal was noted and was recorded in newtons. The force was then converted from newtons into failure stress as Megapascal (MPa) by the following formula $Failure\ stress\ (Megapascal) = Force\ (Newtons) Surface\ area\ of\ prepared\ tooth\ in\ sq.mm$ The data obtained was subjected for statistical analysis.

RESULTS

Statistical analysis was executed using IBM SPSS statistics 20. A parametric test; One-way ANOVA presenting the mean values of force of retention with standard deviations of RelyX Ultimate Clicker resin cement and Multilink Automix resin cement on the three different tapers is provided in Table 1 and Table 2 respectively.

Table 1. Comparison of force of removal with RelyX Ultimate Clicker resin cement on the three different taper angles 6°, 12° and 30°

Taper angles	6^0	12^0	30^0	*p-value	Post hoc test
	Mean ± SD	Mean ± SD	Mean ± SD		
Force(Mpa)	5.42 ± 0.98	4.76 ± 0.76	3.97 ± 0.81	0.016	$6^0 > 30^0$
*One way ANOVA with post hoc Tukey's test					

There was a significant difference between the force of removal for Relyx Ultimate at 6 and 30 degree taper.

Table 2. Comparison of force of removal with Multilink Automix resin cement on the three different taper angles 6°, 12° and 30°

Taper angles	6^0	12^0	30^0	*p-value	Post hoc test
	Mean ± SD	Mean ± SD	Mean ± SD		
Force(Mpa)	5.23 ± 0.69	4.44 ± 0.82	3.75 ± 0.72	0.003	$6^0 > 30^0$
*One way ANOVA with post hoc Tukey's test					

There was a significant difference between the force of removal for Multilink Automix at 6 and 30 degree taper group IIA and IIC.

The mean values with standard deviations of the retentive properties of both the cements were obtained using Independent't' test, provided in Table 3.

Table 3. Comparison of retentive properties of different resin cements

Angle	RelyX Ultimate	Multilink	p – value
	Mean ± SD	Mean ± SD	
6^0	5.42±0.98	5.23±0.69	0.65*
12^0	4.76±0.92	4.44±0.82	0.47*

The influence of three different tapers; 6°, 12°, and 30° on the mean forces of removal of the metal crowns from the prepared teeth when tested individually with two cements, displayed statistically significant differences ($p<0.05$). Within the three different convergent angles, post hoc Tukey test was carried out, the results demonstrated greater degree of force of removal with 6^0 convergent angles when compared to 30^0 convergent angle.

However, the two adhesive resin cements; RelyX Ultimate Clicker resin and Multilink Automix when compared and evaluated for the retentive properties did not show any statistically significant differences. ($p>0.05$)

DISCUSSION

The present investigation was conducted to determine the effect of the taper of the tooth 6°, 12° and 30°on retention of metal crowns when luted by the resin cements. Two commercially available adhesive resin cements RelyX Ultimate Clicker and Multilink Automix were chosen. The failure stress was assessed by the use of crown pull off test. The other method to assess the adhesive properties of cements include tests for bond strength, tensile strength, and micro-tensile strength.[3] Bond strength test is reliable test and easy to conduct but is criticized as it does not simulate clinical situation. Crown pull of test simulates the clinical condition better than other tests. Various studies have been published where crown pull off test was used.[7]

The influence of taper angle on retention of metal crowns using resin cements was noted in the present study. The study showed that mean retentive failure stress on metal crowns luted with Relyx Ultimate and Multilink Automix showed statistically significant decrease when taper angle of prepared tooth was 6 degrees compared to taper angle of 30 degrees. But mean retentive crown pull off failure stress on metal crowns showed no statistically significant difference at 12 degree taper when compared to either 6 degree taper or 30 degree taper. Rosensteil et al [1] described and various studies explained that when the taper is less it limits the path of withdrawal. While as taper increases free movement of restoration increases and results in decreased retention. Studies by Jogrenson[10], Kaufman et al[11] , Dodge WW et al[12], Hovijitra et al[13] had reported these results earlier. Wilson et[14] recommended taper of 6 as ideal taper, however some studies reveal that many dentists show tendency to overtaper the tooth preparation especially in posterior teeth with limited access. The present study therefore took in account taper angle as high as 30°

Zidan et al [9] reported that increase in taper angle from 6 degrees to 24 degrees decreased the mean failure stress value by 20 percent for resin cements and 40 percent for the glass ionomer cement. Omar mowafy et al[15] found out significantly higher failure stress at 12 degree convergence angle compared to at 35 degrees.

In contrary to the present study Osman et al 2010 et al[16] found no statistically significant difference in failure stress values for metal crowns luted with Panavia Resin Cements for taper angle as low as 12 degrees and as high as 120 degrees.

Present study also compared the influence of adhesive resin cements on failure stress. There was no statistically significant difference when the mean of value of failure stress for Multilink Automix and RelyX ultimate clicker at all the taper (6, 12, 30) were compared. (Table 3).

In similar study Zidan et al [9] did not find significant difference between two adhesive resin cements (C&B Metabond and Panavia) at different taper angles (6, 12, 24). Ernst et al[17] compared different commercialy adhesive resin systems and found no significant difference in retentive properties between them.

Even though RelyX ultimate showed better results than Multilink automix there was not much of difference

between retentive qualities of the two cements. As oral conditions are difficult to simulate in the laboratory, the results obtained should be interpreted with caution and clinical validation. Also in this study metal castings were used which limited the use of light curing option, therefore retentive properties of these cements may vary when used in all ceramic crowns

CONCLUSION

Within the limitation of the study it can be concluded that angle of convergence for the tooth preparation should be as minimal as possible (6 degree), but angle until 12 degrees is acceptable for good retention. Whereas when the taper angle increases as high as 30 degrees the retention is affected even with the use of adhesive resin cements.

RelyX Ultimate Clicker and Multilink Automix are equally effective as luting agents for cementation of metal crowns.

Ethical Clearance: Permission taken from the institutional research committee. Animal or human subjects are not involved in the stuy.

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REFERENCES

1. Rosenstiel, Stephen F, Martin F. Land, and Junhei Fujimoto. Contemporary Fixed Prosthodontics. 4th Edition, St. Louis, Missouri. : Mosby Elsevier, 2006. p. 225-230
2. Goodacre CJ, Campagni WV, Aquilino SA. Tooth preparations for complete crowns: an art form based on scientific principles. J Prosthet Dent. 2001; 85(4):363-76.
3. Edelhoff D, Ozcan M. To what extent does the longevity of fixed dental prostheses depend on the function of the cement? Working Group 4 materials: cementation. Clin Oral Implants Res. 2007; 18 Suppl 3:193-204.
4. Rosenstiel SF, Land MF, Crispin BJ. Dental luting agents: A review of the current literature. J Prosthet Dent. 1998; 80(3):280-301.
5. Krämer N, Lohbauer U, Frankenberger R. Adhesive luting of indirect restorations. Am J Dent. 2000; 13(Spec No):60D-76D.
6. Ladha K, Verma M. Conventional and contemporary luting cements: an overview. J Indian Prosthodont Soc. 2010; 10(2):79-88.
7. Heintze SD. Crown pull-off test (crown retention test) to evaluate the bonding effectiveness of luting agents. Dent Mater. 2010; 26(3):193-206.
8. Chandra shekar S, Giridhar K, Suhas rao K. An in vitro study to evaluate the retention of complete crowns prepared with five different tapers and luted with two different cements. J Indian Prosthodont Soc. 2010; 10(2):89-95.
9. Zidan O, Ferguson GC. The retention of complete crowns prepared with three different tapers and luted with four different cements. J Prosthet Dent. 2003; 89(6):565-71.
10. JØrgensen KD. The relationship between retention and convergence angle in cemented veneer crowns. Acta Odontol Scand. 1955; 13(1):35-40.
11. Kaufman, EG, Coelho, DH, Colin, L. Factors influencing the retention of cemented gold castings. J Prosthet Dent. 1961; 11:487–502.
12. Dodge WW, Weed RM, Baez RJ, Buchanan RN. The effect of convergence angle on retention and resistance form. Quintessence Int. 1985; 16(3):191-4.
13. Hovijitra S, Robinson F, Brehm T. The relationship between retention and convergence of full crowns when used as fixed partial denture retainers. J Indiana Dent Assoc. 1979; 58(4):21-4.
14. Wilson AH, Chan DC. The relationship between preparation convergence and retention of extracoronal retainers. J Prosthodont. 1994; 3(2):74-8.
15. El-mowafy OM, Fenton AH, Forrester N, Milenkovic M. Retention of metal ceramic crowns cemented with resin cements: effects of preparation taper and height. J Prosthet Dent. 1996; 76(5):524-9.
16. Osman SA, Walls AW, Mccabe JF. Crown retention for non-retentive preparations using adhesive resin cements. Eur J Prosthodont Restor Dent. 2010; 18(4):155-7.
17. Ernst CP, Cohnen U, Stender E, Willershausen B. In vitro retentive strength of zirconium oxide ceramic crowns using different luting agents. J Prosthet Dent. 2005; 93(6):551-8.

When Sustainable Development Matters in Health Care Supply Chain: An analysis of Influential Factors of Waste Management

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ABSTRACT

Sustainable development(SD) practices has been adopted by organizations from various sectors to improve their socio-environmental performance. This is because, these days improved socio-environmental performance is key to ensure sustainability in long and gain competitive advantage. Hence, the health care industries are also trying to exploit the benefits of SD practices. SD policies stress on incorporation of sustainability concepts on every stage of organizational activities starting from procurement to disposal of waste. Success of implementation of SD practices in any industry depends on how efficiently it identifies the factors influencing it, their interdependence and degree of influence on SD practices. This study explore the influential pressures of sustainability practices in management of waste in health care sector. Grey relational approach(GRA) is used to prioritize these factors according to their degree of influence on health care waste management (HCWM) practices.

Keywords: *HCWM, Enablers of HCWM, GRA, SD*

INTRODUCTION

Hospitals and allied health care facilities have been established to provide services required for the treatment of sick people. However, there has not been much awareness that these units produce significant amount of waste material during the process of rendering health care related services which have a potential to degrade environment and cause many dreaded disease in humans or animals when exposed to it. Health care or biomedical waste consists of materials that include syringes, needles, used bandages, disposable gloves, human tissues, blood, used culture mediaalong with food materials, packaging materials and scraped medical equipment. Direct exposure to these waste lead to blood, skin, respiratory, eye and intestinal infections even transmission of dreaded diseases like typhoid, cholera, HIV, Tuberculosis, Hepatitis B and C[1]. Prior studies reveals many HCUs either dump their waste in low lying areas or burn in open air or allow the untreated liquid waste to flow through sewerage water. These lead to contamination of soil with heavy metals and toxic chemicals killing useful organisms and reducing soil fertility. Mixing of liquid waste lead to water pollution and burning of these waste without proper precaution lead to contamination of air with carcinogenic gases like dioxin. HCUs have begun to realize the importance of proper waste management practices towards their sustainability and gaining economic advantage as well. In this context, an understanding of influential factors of HCWM and their degree of influence on HCWM practices assumes its importance. Hence, this research focused on investing these factors and evaluating their degree of influence using GRA method.

LITERATURE REVIEW

Sustainable Development

Sustainability which has been found to be good not only for the society and environment, but also for economic health of any organization by enabling the them in reducing risks of environmental accidents, avoiding or reducing generation of waste, increasing energy and material efficiency[2] and innovating new eco-friendly services and process[4] has increasingly become important to businesses[3].

Sustainable Development in Health Care Sector

A sustainable development concept in the context of health care sector is gaining importance these days. HCUs have started procuring devices and equipment which could be either recycled, reuse or safely disposed of after their useful life. Similarly, for safe disposal of wastes several guidelines have been formulated. SD practices could enable the HCUs to reduce their expenditure on material, energy and penalties as well. Aside from the cost investment funds, usage of legitimate SD practices benefits the health care units to get ISO certification and in addition letter of thanks from regional as well as governments which thus will improve the general public image and brand value of the hospitals and empower them to draw more number of patients and remain separated from rivalry. Patients even don't hesitate to pay higher hospital services charges in these health care units(HCUs).

Previous Studies.

Review of literature on sustainable development practices revealed that in Indian context few researchers [18][8][19][20][21][1][26] have studied HCWM practices. However, these studies mostly, employed either questionnaire based survey or field research and personnel interviews for investigating HCWM issues and ignored analytical studies on various influential factors of HCWM. From the literature review it has been identified 10 enablers and 13 barriers of HCWM.

The enablers are being categorised as strength, opportunities and Barrier as Threats. Different enablers as being identified(internal) are anticipated economic benefit[11], Competitive advantage, CSR Activities, Top management vision and Involvement [21], Policies to comply legislative requirement ([1],[27]. Identified enabler categorized as external opportunities are Reduction in landfill capacities, Availability of Advanced Technology , Support and Initiatives from Various Organizations[21],Pressure from socially responsible groups, Awareness and training programs[18]. The barriers variables as identified from the literature review are Poor Segregation Practices,[16][26],Inappropriate Waste Management Operational Strategy, Lack of Green Procurement Policy,[18], Financial Constraints [21] ,Deficient in Accountability of Authorities of Health Care Facilities towards HCWM, Resistance to Change and Adoption , Less Priority to Waste Management issues and Policies [1] . Lack of Waste Treatment Facilities, [21], Insufficient Support from Government Agencies [26], Unavailability of Adequate Waste Management Equipment and Facilities, Inadequate Awareness and Training Programs [1], Lack of coordination between municipality, Pollution Control Board and hospital authorities, [19], Lack of Strict implementation of infection control measures like sterilization and disinfectant techniques. [1].

MATERIALS AND METHOD

The degree of importance of influential factors of waste management practices in health care sector is evaluated with the help of GRA approach. GRA approach is mainly used when there is an uncertainty in decision making . In general, GRA has five steps and they are as follows:

Step one: Collection of initial assessment values from experts and make decision matrix.

Step two: Performing data normalization of the variables using either "Smaller - the better" or "larger is the better" using equations (1) and (2) respectively depending upon their nature.

$$r_{ij} = \frac{\max_i(x_{ij}) - x_{ij}}{\max_i(x_{ij}) - \min_i(x_{ij})} \quad \textbf{1}$$

$$r_{ij} = \frac{x_{ij} - min_i(x_{ij})}{max_i(x_{ij}) - min_i(x_{ij})} \quad \textbf{2}$$

Step 3: In addition, the reference sequence for the variables is calculated using equation (3).

$$\Delta_{ij} = |r_{oj} - r_{ij}| \quad \textbf{3}$$

Step four: Determining the grey relational coefficient:

$$\gamma_{ij} = \frac{\Delta_{\min_{ij}} + \xi \times \Delta_{\max_{ij}}}{\Delta_{ij} + \xi \times \Delta_{\max_{ij}}} \quad \textbf{4}$$

Where, j $\xi(0 \le \xi \le 1)$ is the distinguishing coefficient i.e., used to control the range of the grey relational coefficient; usually j $\xi = 0.5$ [18].

Step five: Determining the grey relational degree and rank the factors.

$$\Gamma_i = \sum_{j=1}^{n} [w_j \times \gamma_{ij}], \quad \textbf{5}$$

$$\sum_{j=1}^{n} w_j = 1$$

where, w_j is the weight of the jth criterion. On the basis of grey relational degree the priority ranking can be estimated. The one with the highest grade of relation is recognized as the best solution.

RESULTS AND DISCUSSION

7 point scale was used to collect data from doctors, nurses, lab technicians and hospital administrators working in hospitals. Five numbers of respondents from each group were requested to suggest their perception regarding the degree of influence of the barriers and enablers on waste management practices. This study considered 10 numbers of enablers and 13 number of barriers. The numerical value assigned by experts' of each category for a particular variable are summed and shown in table 1.

Table 1: Responses of experts regarding HCWM enablers and Barriers

Variables	Doctors	Nurses	HAs	Lab technicians
E1	21	16	21	24
E2	23	23	18	22
E3	20	24	18	22
E4	24	25	27	21
E5	24	30	24	23
E6	13	20	12	14
E7	21	21	21	22
E8	21	25	23	20
E9	26	23	20	24
E10	26	31	25	21
B1	15	26	15	7
B2	14	29	15	9
B3	13	26	16	7
B4	12	25	15	8
B5	13	27	14	8
B6	15	32	20	8
B7	13	29	18	7
B8	14	30	12	9
B9	13	28	18	9
B10	15	28	13	10
B11	10	25	17	9
B12	13	30	10	9
B13	13	29	16	8

After construction of decision matrix, normalization is done for the enablers respectively and the result is shown below.

Table 2: Normalization results for enablers and Barriers of HCWM

Variables	Doctor	Nurses	HA	Lab technician
E1	0.61538462	0	0.6	1
E2	0.76923077	0.466667	0.4	0.8
E3	0.53846154	0.533333	0.4	0.8
E4	0.84615385	0.6	1	0.7
E5	0.84615385	0.933333	0.8	0.9
E6	0	0.266667	0	0
E7	0.61538462	0.333333	0.6	0.8
E8	0.61538462	0.6	0.733333	0.6
E9	1	0.466667	0.533333	1
E10	1	1	0.866667	0.7
B1	0	0.85714286	0.5	1
B2	0.2	0.42857143	0.5	0.333333
B3	0.4	0.85714286	0.4	1
B4	0.6	1	0.5	0.666667
B5	0.4	0.71428571	0.6	0.666667

Cont.... **Table 2: Normalization results for enablers and Barriers of HCWM**

B6	0	0	0	0.666667
B7	0.4	0.42857143	0.2	1
B8	0.2	0.28571429	0.8	0.333333
B9	0.4	0.57142857	0.2	0.333333
B10	0	0.57142857	0.7	0
B11	1	1	0.3	0.333333
B12	0.4	0.28571429	1	0.333333
B13	0.4	0.42857143	0.4	0.666667

Table 3. Grey relational co-efficient of HCWM enablers

Enablers	**Doctor** $\gamma_{ij}(1)$	**Nurses** $\gamma_{ij}(2)$	**HA** $\gamma_{ij}(3)$	**Lab technician** $\gamma_{ij}(4)$
E1	0.56521739	0.333333	0.555556	1
E2	0.68421053	0.483871	0.454545	0.714286
E3	0.52	0.517241	0.454545	0.714286
E4	0.76470588	0.555556	1	0.625
E5	0.76470588	0.882353	0.714286	0.833333
E6	0.33333333	0.405405	0.333333	0.333333
E7	0.56521739	0.428571	0.555556	0.714286
E8	0.56521739	0.555556	0.652174	0.555556
E9	1	0.483871	0.517241	1
E10	1	1	0.789474	0.625
B1	0.33333333	0.777778	0.5	1
B2	0.38461538	0.466667	0.5	0.428571
B3	0.45454545	0.777778	0.454545	1
B4	0.55555556	1	0.5	0.6
B5	0.45454545	0.636364	0.555556	0.6
B6	0.33333333	0.333333	0.333333	0.6
B7	0.45454545	0.466667	0.384615	1
B8	0.38461538	0.411765	0.714286	0.428571
B9	0.45454545	0.538462	0.384615	0.428571
B10	0.33333333	0.538462	0.625	0.333333
B11	1	1	0.416667	0.428571
B12	0.45454545	0.411765	1	0.428571
B13	0.45454545	0.466667	0.454545	0.6

Finally, grey relational grade of the variables were calculated using equation (3) and the influential factors (enablers and barriers) were ranked based on these values as shown in table 4. The higher the grey relational grade the greater is the influence of the variable.

Table 4 Grey relational grade and rank of the enablers

Enablers	GRG	Rank
E1	0.6135	5
E2	0.5842	6
E3	0.5515	9
E4	0.7363	4
E5	0.7987	2
E6	0.3514	10
E7	0.5659	8
E8	0.5821	7
E9	0.7503	3
E10	0.8536	1
Barriers	GRG	Rank
B1	0.6528	4
B2	0.4450	12
B3	0.6717	2
B4	0.6639	3
B5	0.5616	7
B6	0.4000	13
B7	0.5765	5
B8	0.4848	9
B9	0.4515	11
B10	0.4575	10
B11	0.7113	1
B12	0.5737	6
B13	0.4939	8

CONCLUSION AND SCOPE OF FUTURE WORK

This study is conducted with an objective to explore various influential factors for implementation of sustainable practices in health care waste management. Through review of literature and expert consultation 23 such factors s were identified. The identified factors were further classified as enablers those encourage adoption of HCWM practices and barriers those offer resistance to its adoption.Both the enablers and barriers were further categorized as external and internal. External enablers were termed as opportunity while the internal as strength similarly the internal and external barriers were categorized as weakness and threat respectively. All the factors identified in this study were prioritized with respect to their degree of influence on HCWM practices using GRA methodology. The factors with rank 1 is indicates its higher influence on HCWM practices. Similarly, a factor with rank 10, 11, 12 and 13 indicates lesser influence of these factors on HCWM. The results revealed that Awareness and training programs are perceived as the most important factor while Top Management vision and involvement is the second most important factor for success of HCWM practices.Analysis of the barriers claimed that Inadequate Awareness and Training Programs and Lack of Green Procurement Policy were observed as the major hindrances. Hence, Organizations interested for implementation of HCWM practices should conduct intensive training and awareness programs. Proactive involvement of top management should be implemented in green procurement policies. Though, this study quantified the degree of influence of various influential pressures yet failed to capture the vagueness in human judgement. Hence, a fuzzy GRA analysis may be performed in future to capture the vagueness.

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

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REFERENCES

1. Swain, S., Muduli, K., Biswal, J. N., Tripathy, S., & Panda, T. K. et al. Evaluation of Barriers of Health Care Waste Management in India-A Gray Relational Analysis Approach.In *Proceedings of the 5th International Conference on Frontiers in Intelligent Computing: Theory and Applications.2017*.515(1):181-188.Springer, Singapore.
2. Luthra, S., Mangla, S. K., Shankar, R., Prakash Garg, C., & Jakhar, S. et al. Modelling critical success factors for sustainability initiatives in supply chains in Indian context using Grey-DEMATEL. *Production Planning & Control.2018* :1-24.
3. Luthra, S., Mangla, S. K., Chan, F. T., & Venkatesh, V. G. et al. Evaluating the Drivers to Information

and Communication Technology for Effective Sustainability Initiatives in Supply Chains. *International Journal of Information Technology & Decision Mak*ing.2017 (01):311-338.

4. Gonzalez, E. D., Sarkis, J., Huisingh, D., Huatuco, L. H., Maculan, N., Montoya-Torres, J. R., & de Almeida, C. M. Et al. Making real progress toward more sustainable societies using decision support models and tools: introduction to the special volume. *Journal of Cleaner Production*.2015.*105:*1-13.
5. Al-Khatib, I. A., & Sato, C. et al. Solid health care waste management status at health care centers in the West Bank–Palestinian Territory. Waste management.2009. 29(8):2398-2403.
6. Marinković, N., Vitale, K., Holcer, N. J., Džakula, A., & Pavić, T. et al.. Management of hazardous medical waste in Croatia. Waste management. 2008. 28(6):1049-1056.
7. Thakur, V., & Ramesh et al. A. Healthcare waste management research: A structured analysis and review (2005–2014). Waste Management & Research,2015:1–16, 0734242X15594248.
8. Sharma, A., Sharma, V., Sharma, S., & Singh, P. et.al . Awareness of biomedical waste management among health care personnel in Jaipur, India. Oral Health Dent Manag, 2013.12(1):32-40.
9. Zurbrügg, C., Gfrerer, M., Ashadi, H., Brenner, W., & Küper, D. et al. . Determinants of sustainability in solid waste management–The Gianyar Waste Recovery Project in Indonesia. Waste management.2012 32(11):2126-2133.
10. Tsakona, M., Anagnostopoulou, E., & Gidarakos, E. et al .. Hospital waste management and toxicity evaluation: a case study. Waste management, 2007. 27(7):912-920.
11. Komilis, D., Fouki, A., & Papadopoulos, D. et al. . Hazardous medical waste generation rates of different categories of health-care facilities. Waste Management.2012 32(7):1434-1441.
12. Conrardy, J., Hillanbrand, M., Myers, S., & Nussbaum, G. F. et al. . Reducing medical waste. AORN journal. 2010. 91(6):711-721.
13. Berwick, D. M., &Hackbarth, A. D. ety al. . Eliminating waste in US health care. Jama. 2012. 307(14):1513-1516.
14. Dursun, M., Karsak, E. E., & Karadayi, M. A. et al. . A fuzzy multi-criteria group decision making framework for evaluating health-care waste disposal alternatives. Expert Systems with Applications, 2011. 38(9):11453-11462.
15. Cagliano A.C.; Grimaldi S.; Rafele C. et al. A systemic methodology for risk management in healthcare sector. In: SAFETY SCIENCE.2011.49(5):695-708
16. Manga, V. E., Forton, O. T., Mofor, L. A., & Woodard, R. et al. . Health care waste management in Cameroon: A case study from the Southwestern Region. Resources, Conservation and Recycling,2011.57:108-116.
17. Loveday, H. P., Wilson, J., Pratt, R. J., Golsorkhi, M., Tingle, A., Bak, A., ...& Wilcox, M. et al. . epic3: national evidence-based guidelines for preventing healthcare-associated infections in NHS hospitals in England. Journal of Hospital Infection,2014. 86, S1-S70
18. Thakur, V. and Anbanandam R. et al..Healthcare waste management: an interpretive structural modeling approach.International Journal of Health Care Quality Assurance. 2016.29(5) :559-581
19. Madhukumar, S., & Ramesh, G. et al. . Study about awareness and practices about health care waste management among hospital staff in a medical college hospital, Bangalore. Iranian Journal of Basic Medical Sciences, 2012.3:7-11.
20. Das, S. K., & Biswas, R. et al. . Awareness and practice of biomedical waste management among healthcare providers in a Tertiary Care Hospital of West Bengal, India. International Journal of Medicine and Public Health.2016.6(1):19.
21. Muduli K, BarveA. :Barriers to Green Practices in Health Care Waste Sector: An Indian Perspective. International Journal of Environmental Science and Development. 3(4) (2012):393-399
22. Hashemi, S. H., Karimi, A., &Tavana, M. et al. . An integrated green supplier selection approach with analytic network process and improved Grey relational analysis. International Journal of Production Economics,2015. 159:178-191.
23. Jiang, P., Hu, Y. C., & Yen, G. F. . Applying Grey Relational Analysis to Find Interactions between Manufacturing and Logistics Industries in Taiwan. Advances in Management and Applied Economics, 2017.7(3):21.

24. Song, W., Ming, X., & Han, Y. . Prioritising technical attributes in QFD under vague environment: a rough-grey relational analysis approach. International journal of production research, 2014.52(18):5528-5545.

25. Wen, K. . The proof of a new modified grey relational grade. Grey Systems: Theory and Application,2016. 6(2):180-186

26. Mishra, S. S., Muduli, K., Dash, M., & Yadav, D. K. . PROMETHEE-Based Analysis of HCWM Challenges in Healthcare Sector of Odisha. In *Smart Computing and Informatics* 2018.:163-170. Springer, Singapore.

27. Manyele SV, Anicetus H. Management of medical waste in Tanzania hospitals. Tanzania Journal of Health Research. 2006;8(3).

Mineral Trioxide Aggregate Apexification a Novel Approach for the Tooth with open Apex – A Case Report

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ABSTRACT

Mineral Trioxide Aggregate (MTA) was introduced as an alternative to traditional materials for the pulp-capping,repair of root perforations and as a retrograde root filling due to its superior biocompatibilty and ability to seal the root canal system. Traditionally, calcium hydroxide has been the material of choice for the apexification of immature permanent teeth but MTA holds significant promise as an alternative to multiple treatments with calcium hydroxide. The inadequacy of calcium hydroxide apexification due to its long time span and re-infection because of temporary seal led to the use of MTA. In this case report of MTA apexification along with backfilling using thermoplasticised Gutta Percha and coronal rehabilitation of a fractured upper central incisor with open apex.

Keywords : *Open-apex, mineral trioxide aggregate, apexification*

INTRODUCTION

Trauma to the tooth during the eruption period may damage the Hertwig's epithelial root sheath leading to cessation of root end development, resulting in an open apex. Generally root development continues for 3- 4 years after eruption .[1,2] American Association of Endodontists in 2003 defined apexification as 'a method to induce a calcified barrier in a root with an open apex or the continued apical development of an incomplete root in teeth with necrotic pulp'. The main objective of apexification was to prevent the passage of toxins and bacteria into the periapical tissues by forming a barrier at the root apex, and also to allow the compaction of the root filling material.[3]

Even though Calcium hydroxide has been widely used over the years for the stimulation of hard tissue barrier, it requires 5–20 months to form the barrier.[4] Studies have also shown an increased risk of tooth fracture with prolonged exposure to calcium hydroxide.[5,6,7]

In recent times, mineral trioxide aggregate (MTA) has replaced calcium hydroxide as the most popular material for the apexification procedure, as it has shown a greater consistency in producing apical hard tissue when compared to calcium hydroxide.[8]In this case report of MTA apexification along with backfilling using thermoplasticised Gutta Percha and coronal rehabilitation of a fractured upper central incisor with open apex.

Case report

An 18 year old female patient reported to the dental clinic with a fractured central incisor, Figure1 (A). Patient gave a history of trauma 12 years back. There was no relevant medical history. On clinical examination, there was a blackish discoloration associated with tooth #21 along with fracture of the incisal edge extending into the dentin. The tooth was tender on percussion. Periapical radiograph showed a wide open apex with a well-defined periapical radiolucency in relation to tooth #21. Figure 1 (B)

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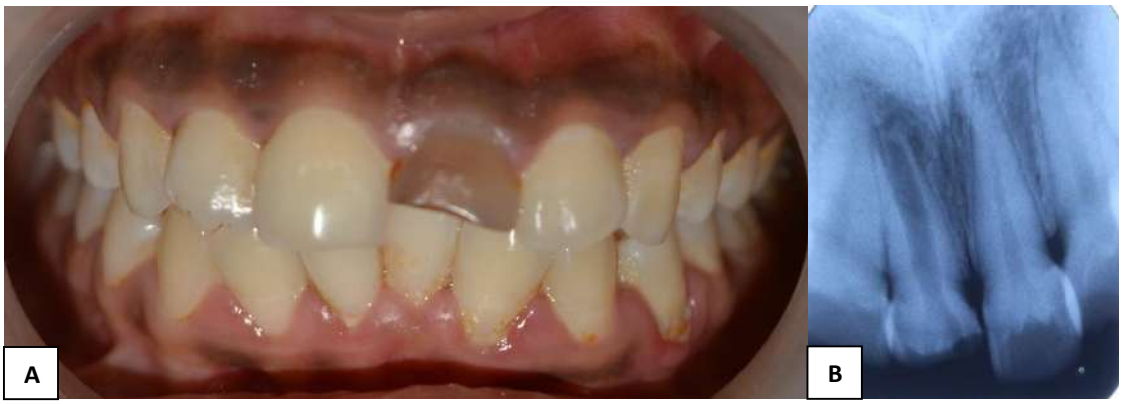

Figure 1:

A: Pre-operative clinical picture, note the discolouration w.r.t tooth #21

B: IOPA showing open apex

Access opening was done under rubber dam isolation and working length was determined using the radiographic method (Figure 2-A). Chemo mechanical preparation of the root canal was done using the no. 80 K-file and 0.5 % sodium hypochlorite solution was used for irrigation of the canal along with saline and 17% EDTA.

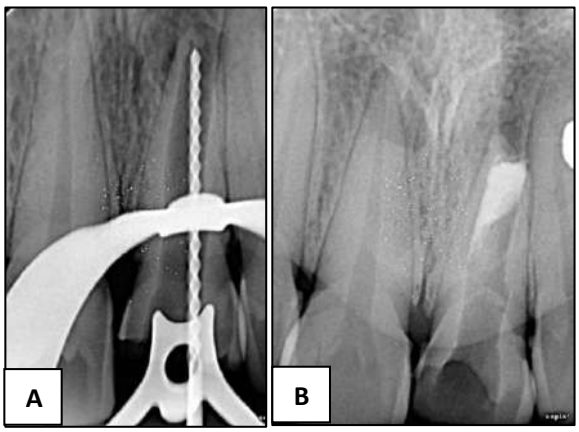

Figure: 2 A: Working length determination B: MTA plug at the apex

White MTA Angelus (Angelus, Londrina, PR, Brazil) was mixed according to manufacturer's instructions and gently condensed using hand pluggers, gently condensed to form 4 mm of apical plug. [Fig: 2(B)]. Moist cotton pellet was placed and a temporary restoration done using Zinc oxide eugenol cement. Patient was recalled after one week for obturation. Gutta percha obturation was with using the backfilling technique with Obtura thermoplastic obturation system(figure3-A). AH plus sealer was used. Post operative clinical picture is as shown in figure 3(B). Post endodontic restoration was done using Filtek Z 350(3M ESPE,USA) and tooth was prepared to receive ceramic crown fused to metal. (Figure 4)

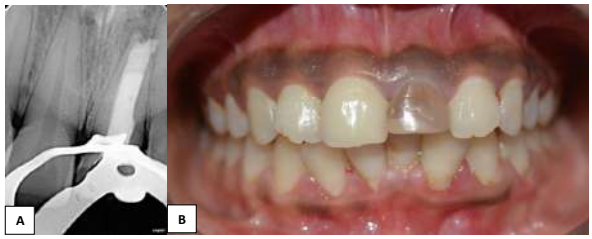

Figure: 3

A: Post- obturation radiograph

B:Post endodontic build up was done using composite.

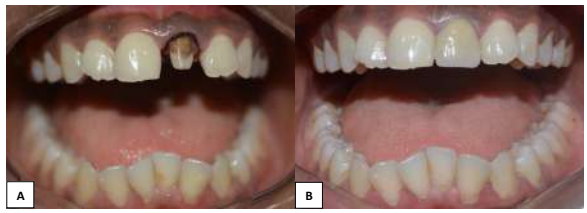

Figure: 4

A : Tooth preparation for receiving porcelain fused to metal, full coverage restoration

B: Post crown cementation picture.

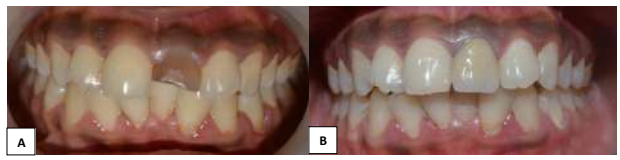

Figure: 5

A and B : Pre operative and post operative clinical images

DISCUSSION

Over the years, calcium hydroxide has been the considered as the gold standard material for apexification;

since it has bactericidal effect with an alkaline pH, which is considered responsible for stimulating apical calcification.[9]

The basic disadvantage of calcium hydroxide is the formation of necrotic zone, therefore its usage and popularity has drastically reduced. Other drawbacks include delayed treatment, multiple visits, low patient acceptance, unpredictability of apical closure and difficulty in patient follow-up.[10] An alternative to calcium hydroxide is MTA.

Thorough irrigation, and proper disinfection protocol has to be followed for the success of the root canal before the obturation. When compared to completely closed apex, the root canals with open apices have more communication. So disinfection of canal was done using 0.5% sodium hypochlorite in this case and calcium hydroxide dressing was given for periapical healing and eliminating the survived bacteria after cleaning and shaping.[11,12] MTA is condensed using Endodontic pluggers at the root end, followed by obturation.

The mineral trioxide aggregate (MTA) in 1998 was considered as a therapeutic endodontic material for humans by US Food and Drug Administration.[13–15] MTA has been proved to have superior sealing ability compared to amalgam, zinc oxide eugenol and super-ethoxybenzoic acid.[16–19] Because of its superior properties, MTA has shown effective results as direct pulp-capping agent when compared with Ca(OH)2. [20–22]

MTA has a good sealing ability which results in less microleakage, better antibacterial properties making it biocompatible, high marginal adaptation, and a pH of 12.5. MTA has also been used for scaffolding for hard tissue formation. It helps in the production of interleukins and cytokines release. Hence, it is capable of promoting hard tissue formation. Clinicians may restore the tooth after setting of MTA. Thus, the fracture resistance of teeth with thin dentinal walls increases.[23]

CONCLUSION

Selection of material as an apical plug for the formation of the hard tissue barrier and the thickness of MTA apical plug plays a crucial role for the clinical success of procedure. A 5mm apical plug of MTA is considered better when compared to 2mm apical plus as it produces less microleakage. In this present case report, MTA as an apical plug helped in root end closure and good healing which resulted in successful treatment out

Conflict of Interest- Nil

Ethical Clearance – Taken from Institutional Ethical Committee

Source of Funding- Self

1. REFERENCES

2. Holland GR, Trowbridge HO, Rafter M. Protecting the pulp, preserving the apex. In: Torabinejad M, Walton RE, eds. Endodontics, Principles and Practice, 4th edn. Philadelphia: Saunders, 2009: 29–34
3. Rafter M. Apexification a review. Dent traumatol 2005 ; 21: 1-8
4. Simon S, Rilliard F, Berdal A, Machtou P. The use of mineral trioxide aggregate in one-visit apexification treatment: a prospective study. International Endodontic Journal. 2007 Mar 1;40(3):186-97.
5. Sheehy EC, Roberts GJ. Use of calcium hydroxide for apical barrier formation and healing in non−vital immature permanent teeth: A review.Br Dent J 1997;183:241−6.
6. Andreasen JO, Farik B, Munksgaard EC (2002) Long-term calcium hydroxide as a root canal dressing may increase risk of root fracture. Dental Traumatology 18, 134–7.
7. Andreasen JO, Munksgaard EC, Bakland LK (2006) Comparison of fracture resistance in root canals of immature sheep teeth after filling with calcium hydroxide or MTA. Dental Traumatology 22, 154–6.
8. Felippe MC, Felippe WT, Marques MM, Antoniazzi JH (2005) The effect of the renewal of calcium hydroxide paste on the apexification and periapical healing of teeth with incomplete root formation. International Endodontic Journal 38, 436–42
9. Shabahang S, Torabinejad M, Boyne PP, Abedi H, McMillan P. A comparative study of root−end induction using osteogenic protein−1, calcium hydroxide, and mineral trioxide aggregate in dogs. J Endod 1999;25:1−5.
10. Binnie WH, Mitchell DF. Induced calcification in the subdermal tissues of the rat. J Dent Res 1973;52:1087.
11. Shabahang S, Torabinejad M, Boyne PP, et al. A comparative study of root-end induction using

osteogenic protein-1, calcium hydroxide, and mineral trioxide aggregate in dogs. J Endod 1999;25:1–5.

12. Kusgoz A, Yildirim T, Tanriver M, Yesilyurt C. Treatment of horizontal root fractures using MTA as apical plug: report of 3 cases. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology. 2009 May 31; 107(5):e68-72.
13. Zahed Mohammadi, Hamid Jafarzadehb, Sousan Shalavi, Flavio Palazzi. Recent Advances in Root Canal Disinfection: A Review. Iranian Endodontic Journal 2017;12(4): 402-406.
14. Dentsply Endodontics. Materials safety data sheet (MSDS): ProRoot MTA (mineral trioxide aggregate) root canal repair material. Tulsa: Dentsply Endodontics, 2001.
15. Schwartz RS, Mauger M, Clement DJ, et al. Mineral trioxide aggregate: a new material for endodontics. J Am Dent Assoc 1999;130:967–75.
16. Torabinejad M, Hong CU, McDonald F, et al. Physical and chemical properties of a new root-end filling material. J Endod 1995;21:349–53
17. Torabinejad M, Hong C, Pitt FT, et al. Cytotoxicity of four root-end filling materials.J Endod 1995;21:489–92.
18. Pitt FT, Torabinejad M, Abedi H, et al. Using mineral trioxide aggregate as a pulp-capping material. J Am Dent Assoc 1996;127:1491–4.
19. Sluyk S, Moon P, Hartwell G. Evaluation of setting properties and retention characteristics of MTA when used as a furcation perforation repair material. J Endod 1998;24:768–71.
20. Tang HM, Torabinejad M, Kettering J. Leakage evaluation of root-end filling materials using endotoxin. J Endod 2002;28:5–7
21. Torabinejad M, Chivian N. Clinical applications of mineral trioxide aggregate. J Endod 1999;25:197–205.
22. Faraco IM Jr, Holland R. Response of the pulp of dogs to capping with mineral trioxide aggregate or a calcium hydroxide cement. Dent Traumatol 2001;17:163–7
23. Aeinehchi M, Eslami B, Ghanbariha M, et al. Mineral trioxide aggregate (MTA) and calcium hydroxide as pulp-capping agents in human teeth: a preliminary report. Int Endod J 2003;36:225–31.
24. Gunes B, Aydinbelge HA. Mineral trioxide aggregate apical plug method for the treatment of non vital immature permanent maxillary incisors: three case reports. J Conserv Dent 2012;15

Goal Directed Physiotherapy Treatment Program for improving Lower Extremity Function in a child with Spastic Paraplegic Cerebral Palsy. A Case Report

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ABSTRACT

Spastic Paraplegic Cerebral Palsy (CP) involves both the lower limbs which effects balance and gait in children. These individuals are treated by physiotherapy with various means like Stretching, Strengthening, application of Neurodevelopmental Therapy (NDT), Task oriented approach and Proprioceptive Neuromuscular Facilitation (PNF) but there is no evidence on goal oriented physiotherapy program using various approaches for the treatment of spastic paraplegic CP children. Here we report a case of a 9-year-old boy diagnosed with spastic paraplegic CP, who underwent 5 months of Goal directed Physiotherapy Program. Documented improvements in muscle tone, balance and various parameters of gait reveal promising outcome. Hence we propose goal directed physiotherapy treatment might improve balance and gait in children with spastic paraplegic CP.

Keywords: *Spastic Paraplegic CP, Physiotherapy, Rehabilitation, NDT, PNF, Physical activity, Paediatric Rehabilitation.*

INTRODUCTION

Cerebral palsy describes a group of permanent disorders of the development of movement and posture, causing activity limitation, that are attributed to non-progressive disturbances that occurred in the developing fetal or infant brain. The motor disorders of cerebral palsy are often accompanied by disturbances of Sensation, Perception, Cognition, Communication and behavior: by epilepsy, and by secondary musculoskeletal problems.[1] Prevalence in general population is found to be 2-2.8/1000.[2]

Children with spastic paraplegic cerebral palsy suffers with spasticity of lower limb muscles.[3] Spasticity associated with cerebral palsy can lead to musculoskeletal complications, such as contractures, pain and subluxation[4]. which affects the pelvic movements and thereby causing alterations in the lower trunk control which leads to functional limitations. Most of these limitations will affect the individual's physical, socially and emotional health leading to decline in their health related quality of life[5].

Children with spastic CP involving lower limbs have a very good upper limb function but the disability involving the lower limbs hinders the child to involve with the peer group and participate in various outdoor activities.[6]

There is a paucity in the literature related to spastic paraplegic cerebral palsy. Studies regarding goal directed treatment for improving lower limb function is also scarce. Bobath concept aims to improve Gross Motor Function and Postural Control by facilitating muscle activity through key points of control assisted by the therapist.[7] The purpose of this case report is to explain the importance of goal directed physiotherapy program involving NDT, Task oriented approach, PNF Techniques in the treatment of balance and gait issues in

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children with spastic paraplegic CP.

Case Report:

The child was a 9 years old boy diagnosed with Spastic Paraplegic Cerebral Palsy. He was presented with the following problems in Physiotherapy department of Justice KS Hegde Charitable Hospital, Deralakatte Mangaluru, Karnataka, India

Problem List:

Spasticity Grade 1+ in Bilateral hamstrings, Hip adductors, hip flexors Grade 1 was noted in bilateral plantar flexors according to Modified Ashworth Scale. Final 10 degrees of active Extensor lag was noted in left knee joint and 5 degrees was noted in right knee joint Lacks ability to shift weight in standing posture, weakness of bilateral gluteus maximus, hip abductors, knee extensors, and dorsiflexors of ankle. Cannot maintain balance in activities involving transitions in positions. Difficulty in walking independently not even 5 steps, scissoring was noted in gait.

On the day 1, assessment was taken where spasticity was measured by modified ashworth scale (MAS)[8], balance was measured by Paediatric Balance Scale (PBS)[9], parameters of gait like Stride length (by chart paper), Cadence (number of steps using stop watch) and Speed (by 10 meter walk test) were measured. Child was at Stage III of GMFCS.[10]

Child was treated from June 2017 to October 2017 at Justice K S Hegde Charitable hospital for 1-and-a-half-hour session, 6 days a week for 5 months. Task oriented training and NDT were given together followed by strength training by PNF the next day.

Treatment goals are the basis for treatment planning, gives direction to the treatment and helps in planning discharge.

Long term goal (5 months): Mr. X will walk from his bedroom to washroom (approx.30 meters) at his home independently for five consecutive days without scissoring of lower extremities

Short term goal 1(6 weeks): Mr. X will stand independently by holding a ball with both hands and throw it in basket which is kept at 5 meters' distance without losing balance at least 5 times in 2 mins

Short term goal 2 (12 weeks): Mr. X will walk for 10 steps independently without scissoring while entering home from parking area

Treatment goal 1: Mr X will be able to maintain balance in kneeling position to lift a ball from ground and to throw it in a basket kept at 3 meters' distance.

Treatment goal 2: Mr. X will be able to do transition from kneeling to half kneeling with minimal assistance progressed to independent transition to get up to standing position.

Treatment goal 3: Mr. X will shift the weight on his left leg and place the right leg on a stool of 15 cms height with minimal support of therapist without losing balance

Treatment goal 4; Mr. X will walk 20 steps in parallel bar with mirror without support for 10 steps.[11]

Our first priority was to normalize the tone and it was achieved by prolonged lengthening with various functional positions it was followed with application of various strategies using principles of NDT in task oriented environment targeting transitions involving lower limb. Rhythmic initiation and dynamic reversals were used to strengthen the antagonists to achieve controlled mobility of lower limb in various positions. Task oriented training in standing and walking were used for improving balance. Treatment goals were given priority and timely achievement of treatment goals helped us to achieve short term goals and long term goals in time. Tone was measured by (Modified Ashworth Scale), stride length was measured by chart paper and ink, cadence was measured by using stop watch, gait velocity was measured by using 10 meters walk test, balance was measured by using Paediatric Balance Scale (PBS) on day 1 and after 5 months. Differences in outcome measures before and after treatment Shown in **table 1,** various treatment strategy is shown in **figure 1-4**.

Table 1: Outcome measures before and after treatment

Balance/ gait parameters	Pre intervention	Post intervention
Stride length (Inches)	55	60
Cadence (Steps/min)	72	100
Gait velocity (m/min)	54	63
Paediatric balance scale	35	48

Fig 1: active lengthening of Hip adductors

Fig 2: Active lengthening of hip adductors and hamstrings

Fig 3: Lower extremity Balance training

Fig 4: Task oriented Training

DISCUSSION

NDT is defined as a client centered, hands-on, problem solving approach. It is used in the management and treatment of children who have disorders of function, movement or postural control because of damage in their central nervous system. This approach uses clinical reasoning rather than a series of standardized techniques.[7] We have followed principles of NDT in International classification of functional disability and health (ICF) format. Long term goal is the therapist professional judgement of how long a client requires to achieve the functional task our long term goal was based on the priority of child and parents. To achieve the controlled mobility Spasticity, strength and range of motion of joints were our primary concern. To achieve them we used Task oriented strength training, focused on strengthening the lower extremities and practicing functional tasks similar to those the child performs during daily activities. Task-oriented training is defined as the repetitive training of significant, functional activities or element of such activities, to acquire well-organized and effective motor skill.[12] Proprioceptive Neuromuscular Facilitation (PNF) techniques stimulates the proprioceptors of the muscle to enhance the performance, flexibility and balance. PNF has been proven to be effective in improving the lower limb function in cerebral palsy children with spastic diplegia.[13] Rhythmic initiation and dynamic reversals were used to strengthen the weak muscles to achieve controlled mobility of lower limb. Weight shifting training and controlled stepping helped in improving stride length. Improved strength of bilateral gluteas maximus, hip abductors and knee extensors along with dorsiflexors of ankle helped in improvement of cadence and gait velocity thereby balance. The child's active participation helped in the faster recovery. Accurate planning, continuity of treatment and periodic measurements of outcome helped in successfully achieving the treatment goals. Short term goals and Long term goals. Hence application of evidence based approaches by setting a proper goal and achieving it stepwise is proved to be beneficial rather than targeting the impairments alone.

CONCLUSION

Goal directed treatment using NDT, Task oriented approach and PNF proved to be effective in the management of children with spastic paraplegic cerebral palsy.

Conflict of Interest- None

Funding: Nil

Consent Form: A written informed consent was taken from the parents of the child.

REFERENCES

1. Rosenbaum P, Paneth N, Levitan A, Goldstein M, Bax M, Damiano D, et al. A report: the definition and classification of cerebral palsy. Dev Med Child Neurol. 2007; 109:8-14.
2. Gladstone M. A review of the incidence and prevalence, types and aetiology of childhood cerebral palsy in resource-poor settings. Ann Trop Paediatr. 2010;30(3):181-196.
3. Minear W. L Special Article: A Classification of Cerebral Palsy. Pediatrics. 1956;18;841.
4. Krigger KW. Cerebral palsy: an overview. Am Fam Physician. 2006;73(1):91-100.
5. Gilson K M, Davis E, Reddihough D, Graham K. Quality of Life in Children with Cerebral Palsy: Implications for Practice. J Child Neurol. 2014; 8:1134-1140.
6. Bottcher L. Children with Spastic Cerebral Palsy, Their Cognitive Functioning, and Social Participation: A Review. Child Neuropsychol. 2010;16(3):209-228.
7. Zanon M, Porfírio G, Riera R, Martimbianco A. Neurodevelopmental treatment approaches for children with cerebral palsy. Cochrane Database Syst Rev**.** 2015; 11:1-4
8. Mutlu A, Livanelioglu A, Gunel M. Reliability of Ashworth and Modified Ashworth Scales in Children with Spastic Cerebral Palsy. BMC Musculoskelet Disord. 2008; 9:44
9. Franjoine M, Gunther J, Taylor M. Pediatric Balance Scale: A Modified Version of the Berg Balance Scale for the School-Age Child with Mild to Moderate Motor Impairment. Pediatric Physical Therapy. 2003;15(2):114-128.
10. Bodkin A, Robinson C, Perales F. Reliability and Validity of the Gross Motor Function Classification System for Cerebral Palsy. Pediatric Physical Therapy. 2003;15(4):247-252.
11. Stamer M H Functional Documentation: A Process for the Physical Therapist. 2nd ed. Texas: Therapy Skill Builders; p. 27-37.
12. Salem Y[1], Godwin EM. Effects of Task Oriented training on mobility function in children with cerebral palsy NeuroRehabilitation. 2009;24(4):307-13
13. Kumar C, Ostwal P. Comparison between Task - Oriented Training and Proprioceptive Neuromuscular Facilitation Exercises on Lower Extremity Function in Cerebral Palsy-A Randomized Clinical Trial J Nov Physiother. 2016;06(03):1-9.

What is the Nature of the Activities Used for Children in Kindergarten?

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ABSTRACT

Aim: To do the analysis of the activities used for children in kindergarten

Material and Methods: A cross-sectional study was undertaken to do activity analysis of the activities used for children in kindergarten from Manipal, Udupi district, Karnataka. The proforma based on Occupational Therapy Practice Framework, third edition was used and the teachers were interviewed to collect the list of activities. The activities were analyzed and results were interpreted.

Findings: The descriptive statistics was used to analyse the activities conducted for children based on observed performance with respect to expected performance. The activities were focusing on the performance skills as follows: process skills (59.76%), motor skills (52.53%) and social interaction skills (50.2%).

Conclusion: The results of the current study conclude that the activities conducted in the kindergarten classrooms do focus on process skills, motor skills and social interaction skills.

Keywords: *Performance skills, kindergarten school, activity analysis, school children, occupational therapy, activities.*

INTRODUCTION AND BACKGROUND

The early school environment seems to be a pivotal aspect in children's social development, motor development, and for enhancement of cognitive skills[1]. Kindergarten forms the foundation for a more structured setting for learning with their peers[2]. Authors of the book 'Eager to learn - educating our pre-schoolers' believe that the first five years are crucial for development of all performance areas. The teachers or educators may notice many variations in the children's social, cognitive, motor or physical skills and it is essential for them to understand that these differences are connected to the functional characteristics of the child[3].

Adequate functioning in the school is one of the main performance tasks of any student and the role of occupational therapy in any school environment is to first achieve adequate performance skills to improve student performance. Suggestion for activity adaptations, activity and/or task modifications and assistive devices may be necessary to optimize the child's performance in the school setting[4]. A document made by the authors Gloria Frolek Clark, Leslie Jackson and Jean Polichino states that the occupational therapy services in early school based programs helps the child to participate in activities of daily living, education, work, play, leisure, and social interactions[5].

A study conducted by the Chief Medical Health Officer of the Saskatoon Health Region showed that about

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30.1% of kindergarteners in this region were considered developmentally delayed or 'not ready for school' at the time of entry to primary school[6] in the Western countries. However, reviewed literature showed that no data was available in India related to school readiness in kindergarteners and/or whether the activities conducted in kindergarten focused on the performance skills. Hence, the current study was initiated as a preliminary study to capture this concept in India with the following aim and objectives.

Aim: To do the analysis of the activities used for children in kindergarten

Objectives:

To collect the list of activities used for children in kindergarten.

To do the activity analysis of the collected activities used for children in kindergarten.

Material and Methods:

Research design: A cross sectional study

Sampling method: Convenience sampling

Sample size: 13 kindergartens out of 16 in Manipal were included in the current study. 3 were excluded as the permission was denied.

Selection criteria: Kindergartens which follow Central Board of Secondary Education (CBSE), Indian Certificate of Secondary Education (ICSE), State Board or Matriculation curriculum and within 5 kilometer radius of Manipal were included in the study.

Tool used:

The Occupational Therapy Practice Framework (OTPF): Domain and Process, third edition was used in the current study. The proforma that was developed based on performance skills of OTPF that include motor skills, process skills and social interaction skills was used to analyze the activities.

Procedure

Principals of the 16 kindergartens were approached to obtain permission out of which 13 consented to conduct the study. The study was reviewed and approved by Institute Ethics Committee (KMC, IEC 51/2016). The Principals and the teachers were informed about the study and written consent was taken from them. Appointments were fixed for interviewing the teachers and the school Principals were assured that the name of their institution would be kept confidential. Teachers were interviewed and list of activities were collected from them. The activities were analyzed and results were interpreted.

DATA ANALYSIS

The descriptive analysis was used to find out the percentage of performance skills in 83 different activities. The collected 83 activities were initially analyzed individually by the three of the investigators to avoid bias (as shown in the Table 1). The total number of sub-categories based on performance skills of OTPF were considered as expected performance which was derived by multiplying the individual subcategories of each performance skill by the number of activities and converted to percentage. The data was included for interpretation only when two of the investigator consented for a particular performance skill to be present in the analyzed activity which was considered as the observed performance. The same pattern was followed for all the 83 activities to collect data for interpretation. The percentage of each component was taken to check for expected performance and observed performance.

Table 1: Example of Activity Analysis

Name of the Activity	Activity Demands		
	Motor Skills	Process Skills	Social Interaction Skills
Coloring			-
Origami	-		-
Vegetable printing		-	

FINDINGS

The aim of the study was to collect the list of activities that were used in kindergarten and to analyze the performance skills that these activities demand. A list of 83 activities was obtained and analyzed by three investigators separately and then compilation of the data was done. Literature on kindergarten, describes that children need to have access to good quality kindergarten experiences that focus upon all areas of development as

required for their optimal achievement throughout the early childhood years[7,8].

Out of 13 kindergartens, 4 were CBSE and ICSE each and 5 were state board. As seen in the table 2, the activities were categorized based on approach to activity (individual/group), settings of activity (home-based/ school-based) and location of activity (indoor/ outdoor). These details were provided by the kindergarten teachers and this helped us to develop some characteristics about the activities used. An article written by Bassok, Latham and Rorem compared the kindergartens classrooms through 1998 to 2010 and found that the whole class activities was about 15% in 1998 and by 2010 it increased to 32% [9]. Our study findings are contrary to the above mentioned study, and it concludes that most of the mentioned activities were individual based (55.38%) as opposed to group based (44.62%). An assumption can be made that this shift is majorly seen because in India it is seen that the classrooms generally consist of a large number of students and it might become difficult for one teacher to monitor big groups hence they prefer to conduct individual activities, but no data as such was found to support the current assumption.

Table 2: Descriptive Characteristics of Activities used in Kindergarten

Characteristics of activities	Frequency	Percentage
Approach to activity		
Individual	72	55.38%
Group	58	44.62%
Setting of activity		
Home based	18	13.84%
School based	112	86.16%
Location of activity		
Indoor	97	74.61%
Outdoor	33	25.39%

A total of 83 activities were then analyzed by three individuals separately and the analysis showed that 59.76% of the activities demanded process skills, 52.53% demanded motor skills and 50.2% demanded social interaction skills as observed performance against the expected performance of 100% as shown in Table 3.

Table 3: Percentage of Expected Performance and Observed Performance among Performance Skills

Performance Skills	Expected performance	Observed performance
Motor skills	100%	52.53%
Process skills	100%	59.76%
Social Interaction skills	100%	50.2%

In the current study, the results showed that the kindergarten activities are focused on process skills (59.76%) with reference to Table 3. A lot of kindergarten teachers believe that process skills are fundamental and that kindergarten is the time when children learn the behaviors of teacher directed tasks and learn the rules of the classroom. Hence, it could also be said that kindergartens are now developing a culture of learning related behaviors[10,11]. Thus, it is seen that many other studies support the findings of the present study that most kindergartens are concentrating upon process skills.

According to Table 3, 52.53% of the activities demanded motor skills in the current study. There are still some differences seen in the expected and observed performance for motor skills. The lack in motor skills could be attributed to the fact that most of the activities are indoor activities which focus more on the fine motor skills than the gross motor skills.

Kindergarten is assumed to be the time when the child learns the ropes of social conventions which assist in communicating with peers, adults as well as in social situations[12]. However, the present study showed that social interaction skills (50.2%) has some deficiency in the expected and observed performance level as can be determined from Table 3, and this could be ascribed to the fact that most teachers assign individual activity and so the interaction factor may be comparatively less.

Strengths and limitations

The activity analysis was done by the three investigators independently is one of the strengths of the current study. This was a preliminary study which could aid in further research in this field. The number of schools that were a part of this study were relatively less and hence more number of activities could not be

collected. The study was done on the basis of convenience sampling to get an understanding of the current scenario of kindergarten classrooms and concrete conclusions cannot be drawn from the study because of the fact that the study participants are not randomized. The list of activities analyzed were on a hearsay basis and not on an observational basis because this would have been more time consuming and the investigators had time restraints.

Recommendations

Future studies analyzing the minimum percentage requirement of performance skills for school readiness may be conducted. A longitudinal study with random sampling could also be conducted to get a broader understanding of the scenarios in the kindergarten classrooms. As an occupational therapist who are aware of the developmental stages, we could assist in making universal guidelines for preparatory stages of school readiness.

CONCLUSION

The results of the current study conclude that the activities conducted in the kindergarten classrooms do focus on process skills, motor skills and social interaction skills.

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REFERENCES

1. Ladd GW. Having friends, keeping friends, making friends, and being liked by peers in the classroom: Predictors of children's early school adjustment? Child development. 1990 Aug;61(4):1081-100.
2. Kauerz K. State kindergarten policies: Straddling early learning and early elementary school. Journal of the National Association for the Education of Young Children. 2005 Mar.
3. Bowman BT, Donovan S, Burns MS. Eager to learn: Educating our pre-schoolers: Executive summary. National Academy Press; 2000.
4. Whalen S. Effectiveness of occupational therapy in the school environment. Canchild Centre for Childhood Disability Research. 2003.
5. Clark GF, Polichino J, Jackson L. Occupational therapy services in early intervention and school-based programs (2004). The American journal of occupational therapy: official publication of the American Occupational Therapy Association. 2004;58(6):681-5.
6. A report of the Chief Medical Health Officer on the health status and development of young children in Saskatoon Health Region [Internet]. Public Health Observatory, Population and Public Health, Saskatoon Health Region & Saskatchewan Population Health and Evaluation Research Unit, 2012, p.7.
7. Available from: https://uwaterloo.ca/canadian-index-wellbeing/sites/ca.canadian-index-wellbeing/files/uploads/files/healthy_children_healthy_families_healthy_communities-a_report_of_the_chief_medical_health_officer_on_the_health_status_and_development_of_young_children_in_saskatoon_health_region.pdf
8. Snow K. Variation in children's experience of kindergarten and the common core. Common Core Issue Brief. 2012:1-6.
9. Harrison L, Goldfeld S, Metcalfe E, Moore T. Early learning programs that promote children's developmental and educational outcomes. AIHW; 2012.
10. Bassok D, Latham S, Rorem A. Is kindergarten the new first grade? Aera Open. 2016 Jan 6;2(1):2332858415616358.
11. McDermott PA, Mordell M, Stoltzfus JC. The organization of student performance in American schools: Discipline, motivation, verbal learning, nonverbal learning. Journal of Educational Psychology. 2001 Mar;93(1):65.
12. Duckworth AL, Seligman ME. Self-discipline outdoes IQ in predicting academic performance of adolescents. Psychological science. 2005 Dec;16(12):939-44.
13. Dockrell D, Sylva K, Huxfrod L, Roberts R. Oral language skills in the early years. 2009; 3-4.

Comparative Study of Carbapenem-Sensitive Acinetobacter Infection with Carbapenem-Resistant Acinetobacter Infection among Inpatients of a Tertiary Care Teaching Hospital in South India

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ABSTRACT

Introduction: Acinetobacter (gram-negative bacteria) has become a threat in all the hospitals, especially in the Intensive Care units, being mainly treated with Carbapenem. But now, Carbapenem-resistant bacteria have evolved, Thus, treatment of such a patient with Carbapenem-resistant Acinetobacter infection becomes more difficult. This study will compare the factors that may cause Carbapenem-resistant and Carbapenem-sensitive Acinetobacter infection thereby helping in management of multidrug resistant Acinetobacter infections.

Materials & Methods: This study is retrospective hospital based study executed in hospitals associated with Kasturba Medical College, Mangalore, Karnataka. Records of, 75 patients with Carbapenem-resistant Acinetobacter infection and 75 patients with Carbapenem-sensitive Acinetobacter infection were evaluated using a Proforma prepared after extensive literature review. The collected data were entered in, and analysed using SPSS version 16.0. For qualitative analysis of data, statistical Chi-square test was used and $p < 0.05$ was taken as statistically significant.

Results: Among 75 reports, with Carbapenem-resistant Acinetobacter 3 (4%) of the 75 reports had Acinetobacter resistant to Meropenem and Imipenem. 56 of the 75 reports had Acinetobacter resistant to all the Carbapenems. More than three quarters of individuals with Resistance had Co-morbid conditions present compared to 64% in Sensitive.

24% of Carbapenem-resistant individuals had pneumonia compared to 4% in Carbapenem-Sensitive. ICU admissions were less (26.3%) in sensitive cases compared to resistant (49.3%). Recovery was better in Acinetobacter Sensitive individuals (42.7%) when compared to Resistant which was just 11%.

Keywords: *acinetobacter, carbapenem resistance, co-morbid conditions, ICU Admission*

INTRODUCTION

Acinetobacter (gram-negative bacteria) has become a threat in all the hospitals, especially in the Intensive Care units, all over the world [1]. It is more common in patients who are intubated, catheterized etc. They mainly colonize skin, oropharynx, respiratory tract and urinary tract. They colonize (not so frequently) the gastrointestinal tract [2]. Meningitis, peritonitis, urinary tract infections, endocarditis (native valve infective endocarditis and prosthetic valve endocarditis), community-acquired pneumonia, and cholangitis are very rare association of infection of Acinetobacter. It has been found that patients who undergo liver

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transplantation [3] or cardiac surgery [4] get Carbapenem-resistant Acinetobacter infection.

Predisposing Factors:

Colonization of Acinetobacter is of high tendency when agents of antimicrobial therapy have insignificant or no action against Acinetobacter.

Staying where other patient (like ICUs) are infected with Acinetobacter.

Clinical symptoms: There are no specific clinical symptoms.

Many patients get colonized by Acinetobacter, but all patients do not suffer from infection. It depends on the immunity of the patient.

Acinetobacter species (mainly, *Acinetobacter baumannii*), are usually treated with Carbapenem. But now, Carbapenem-resistant bacteria have evolved, and treatment is given with a combination of Carbapenem and Cephalosporin or Carbapenem and Colistin. [4], [5]

Thus, treatment of such a patient with Carbapenem-resistant Acinetobacter infection becomes all the more difficult. This study will compare the factors that may cause Carbapenem-resistant and Carbapenem-sensitive Acinetobacter infection. Carbapenem-resistant and Carbapenem-sensitive Acinetobacter infection treatment outcomes have not been analyzed and compared in nearly all the studies [5].So, the data obtained from this study will bring forth such a comparison, as well, thereby helping in management of multidrug resistant Acinetobacter infections.

OBJECTIVES

To compare various parameters between the two categories (Carbapenem-sensitive Acinetobacter infection and Carbapenem-resistant Acinetobacter infection) namely, age, number of days of hospital stay, number of co-morbid conditions, number of antibiotics taken, which can lead to the infection.

To compare the outcome of treatment in both the groups of patients

LITERATURE REVIEW

In 2016, a study by C Q Aline et. al, retrospective in nature, was carried out to find out if there were lower chances of survival in patients who had Acinetobacter spp. bacteremia compared to those who had bacteremia due to other pathogens, aiming the critically ill patients. There was no dissimilarity found between patients with *Acinetobacter* spp. and other pathogens, regarding age, sex, APACHE II score, Charlson Comorbidity Score and type of infection according to the investigation done. Diabetes mellitus, Age above 60 years and *Acinetobacter* spp. infection were allied with poor prognosis. From the multicomponent model, *Acinetobacter*spp. infection (HR = 1.93, 95 % CI: 1.25–2.97) and more than 60 years of age were individualistic prognostic factors.

In 2015, a study by Avkan-Oguz V et. al, microorganism's effect was the basis of investigations, which were found in culture of recepients of liver transplant with infection of the surgical site on antibiotic treatment. Findings were that, eighteen (25.4%) cases were polymicrobial especially, Acinetobacter baumannii and Enterococcus species.

In 2014, a study by Nguyen Thi Khanh Nhu et. al, retrospective in nature, done over an 11-year period, aiming at understanding and documenting changes in the agents causing VAP and their susceptibility to antimicrobials in a major infectious disease hospital located in southern Vietnam. A prominent shift from *Pseudomonas* to *Acinetobacter* spp.was observed ,as the most prevalent bacteria and was also found in ventilator's tracheal aspirate associated with Pneumonia patients. Though resistance to antimicrobials was a common occurrence, there was a proportional annual rise in carbapenem-resistant *Acinetobacter* spp. as recorded from 2008 uptil next 3 years (annual trend; odds ratio 1.656, $P=0.010$).

In 2014, a study by Pascale G D, a retrospective study of data, collected prospectively, was performed in a teaching hospital's ICU in Rome, to find the safety and efficiency of Tigecycline doses that was higher than the normal standard dose. Among the main isolated pathogens (mostly Acinetobacter baumanni and Klebsiella pneumoniae), the use of higher than standard doses of tigecycline was the only individualistic predictor of clinical cure (odds ratio (OR) 6.25; 95% confidence interval (CI) 1.59 to 24.57; $P=0.009$).

In 2014, a study by Balkhy H H, retrospective in nature, to examine the extent of resistance to multiple

drugs among common microbial causes of VAP in the adult intensive care unit (ICU), showed that *Acinetobacter* spp. was highly (60-89%) resistant to all antimicrobials including carbapenems (three- and four-class MDR prevalence were 86% and 69%, respectively). There was a worse profile of ICU patients with resistant Acinetobacter, but not patients' outcomes.

In 2008-2009, a retrospective study comparing the results of carbapenem-resistant A. baumannii VAP treated with colistin or with ampicillin-sulbactam, were analysed and it was established to have same results.

In 2003-2004, a retrospective, matched, cohort study by Sunenshine R H et. al, was carried out to study the effect on mortality rates, hospital stay duration and intensive care unit (ICU) stay duration of patients infected with multi - drug resistant strains of Acinetobacter. Healthcare-acquired and community-acquired *Acinetobacter* infections were taken into consideration. In-hospital mortality rates with MDR *Acinetobacter* infections (26%) were higher than susceptible references (18%) or uninfected ones (11%). Antimicrobial drug therapy (discordant) was more customary for MDR *Acinetobacter*–infected patients than for susceptible ones (91% vs. 65%, $p<0.001$). On the other hand, patients with MDR *Acinetobacter* infection, who were treated with conflicting antimicrobial drug therapy, initially were five times more likely of an increased duration of stay in the ICU.

MATERIALS AND METHOD

This study is retrospective hospital based executed in hospitals associated with Kasturba Medical College, Mangalore, Karnataka. Records of, 75 subjects for Carbapenem-resistant Acinetobacter infection and 75 subjects for Carbapenem-sensitive Acinetobacter infection were evaluated using a Proforma prepared after extensive literature review and based on information available from records of patients who were admitted to the hospital. The study population included patients admitted to the hospital with hospital-acquired or community-acquired Carbapenem-sensitive or Carbapenem-resistant Acinetobacter infection.

The collected data were entered in, and analysed using SPSS version 16.0. For qualitative analysis of data, statistical Chi-square test was used and $p < 0.05$ was taken as statistically significant.

RESULTS

TABLE 1: Carbapenem-resistance variation:

Name of carbapenem to which the bacteria is sensitive	Number of individuals (N=75)
None	56 (77.7%)
Meropenem	2 (2.7%)
Imipenem	13 (17.3%)
Ertapenem	0
Both Meropenem and Imipenem	3 (4%)

In the study, it was found that among all the 75 reports collected, of patients with Carbapenem-resistant Acinetobacter, their respective laboratory specimens, were senstitive to one or the other Carbapenems, while 3 (4%) of 75 reports had Acinetobacter resistant to Meropenem and Imipenem. 56 of the 75 reports had Acinetobacter resistant to all the Carbapenems. The above data was highly significant, statistically (p value <0.05).

There was presence of co-morbid conditions in both the categories of individuals, Carbapenem-resistant and Carbapenem-sensitive. An association between the presence of co-morbid conditions and acquitting of Carbapenem-resistant or Carbapenem-sensitive Acinetobacter infection, was proved statistically (Pearson's chi-square test: df-1, p value =0.047).

Though the presence of co-morbid conditions had an association with Carbapenem resistance, the total number of Co-morbid conditions didn't have any statistical significance with Carbapenem resistance or sensitivity.

In the study, it was found that among the 75 individuals who had Carbapenem-resistant Acinetobacter infection, DM was present in 20 (26.7%) patients. In 75 individuals with Carbapenem-sensitive Acinetobacter infection, DM was present in 15 (20%) patients.

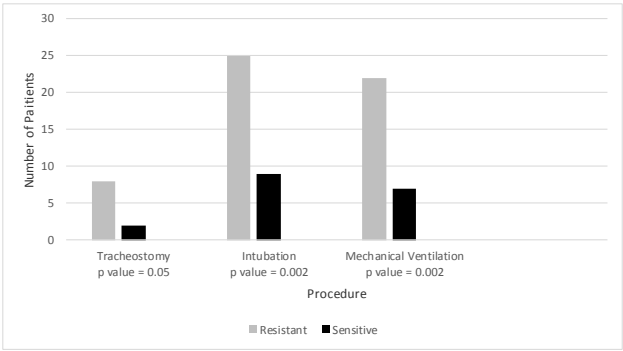
In the study, out of the 75 individuals with Carbapenem-resistant Acinetobacter infection, 21 (28%) of them had Hypertension, and out of the 75 individuals with Carbapenem-sensitive Acinetobacter infection, 22

(29.3%) had Hypertension.

It was noted, only individuals with Carbapenem-resistance also had bronchial asthma as one of the co-morbid conditions. Among the Carbapenem resistant individuals who were 75 in number, 5(6.7%) of them had bronchial asthma (Pearson's chi-square test: df-2, p value < 0.05).

There was a strong association (Pearson's chi-square test: df-2, p value = 0.001), found between Carbapenem-resistant and Carbapenem-sensitive Acinetobacter infection, and presence of other comorbid-conditions (which did not include Hypertension, Diabetes Mellitus, COPD, bronchiectasis). These co-morbid conditions which were taken into account were cancer, CKD, RVD, anemia, IHD, CVA,respiratory problems, hypothyroidism, ALL, IHD, alcohol dependence syndrome, cardiac disorders, urinary incontinence, acute coronary syndrome, encephalitis.

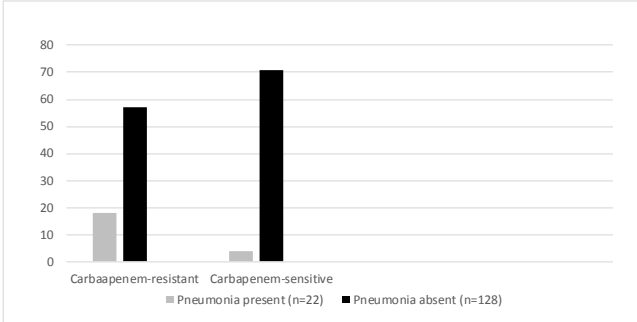
Following Bar Graphs show invasive procedures that were done which shows a strong statistical significance. There was an association between the invasive procedures and Carbapenem-resistant or Carbapenem-sensitive Acinetobacter infection.



Graph 1: Comparison of Invasive Procedures done in Carbapenem Resistant Vs Sensitive Groups

Pneumonia was present in quite a few individuals, both with Carbapenem-sensitivity and Carbapenem-resistance.

The following Bar Graph Number 2 shows a comparison between pneumonia in Carbapenem-sensitive and Carbapenem-resistant patients



Graph 2 : Comparison between pneumonia in Carbapenem-sensitive and Carbapenem-resistant patients

49.3% of Carbapenem-resistant were admitted to ICU compared to 20.6 % of Carbapenem-sensitive. There was high statistical significance (Pearson's chi-square test: df-1, p value = 0.004) among individuals with Carbapenem-resistant or Carbapenem-sensitive Acinetobacter infection and ICU admission.

There were varied specimens from which Carbapenem-resistant Acinetobacter and Carbapenem-sensitive Acinetobacter were obtained.

Out of these samples sputum samples had the highest frequency of Acinetobacter prevalence. Among the 49 sputum samples which had Acinetobacter, 21 (28%) samples contained Carbapenem-resistant Acinetobacter and 28 (37.3%) samples contained Carbapenem-sensitive Acinetobacter.

TABLE 2: Outcome of Treatment

Outcome	Carbapenem-resistant (n=75)	Carbapenem-sensitive (n=75)
Recovered	1 (11%)	32 (42.7%)
Improved	31 (41.3%)	31 (41.3%)
Unchanged	6 (8%)	6 (8%)
Deteriorated	5 (6.7%)	2 (2.7%)
Expired	18 (24%)	4 (5.3%)
Unknown	4 (5.3%)	0

The outcomes of treatment showed high statistical significance (Pearson's chi-square test: df- 5, p value <0.05). Among the 75 patients with Carbapenem-sensitive Acinetobacter infection, maximum, i.e., 32 (42.7%) of them recovered. Among the 75 patients with Carbapenem-resistant Acinetobacter infection, maximum, i.e., 31(41.3%) improved. Among the Carbapenem-resistant patients, 18 (24%) expired while

among the Carbapenem-sensitive patients, 4 (5.3%) expired.

DISCUSSION

The aim of the study was to compare various parameters between the following two categories of patients - Carbapenem-sensitive Acinetobacter infection and Carbapenem-resistant Acinetobacter infection. The various parameters which were considered included, age, number of days of hospital stay, number of co-morbid conditions, number of antibiotics taken, which can lead to the infection and to compare the outcome of treatment in both the groups of patients. The study was retrospective in nature, and was carried out in Karnataka, in two tertiary care hospitals in Mangalore. Data was collected in a proforma prepared after extensive literature review that would help, gain information on all the above mentioned objectives.

The current study included 150 patients' records, of whom 75 were of patients with Carbapenem-resistant Acinetobacter infection and 75 were from patients with Carbapenem-sensitive Acinetobacter infection. In the study by Aline C Q et. al [1], which was also retrospective in nature just like the present one, it was found that critically ill patients who were of age more than 60 years and who had Diabetes Mellitus had significantly poorer prognosis when combined with Acinetobacter infection. But in the present study, it was seen that Diabetes Mellitus or age more than 60 years had no such association with Acinetobacter infection. In this study, it was seen that, bronchial asthma had an association with Carbapenem-resistant Acinetobacter infection. And, it was seen that only individuals with Carbapenem-resistant Acinetobacter infection also had bronchial asthma. There was a high statistical significance (p=0.001) noted with other comorbid conditions(as mentioned previously) and Carbapenem-resistant Acinetobacter infection.

In the study by Balkhy H H , it was seen that there was a worse profile of patients with ICU admission who had Multidrug-resistant Acinetobacter infection. Same was the case with the present study. The current study compared ICU patients with Carbapenem-resistant Acinetobacter infection and ICU patients with Carbapenem-sensitive Acinetobacter infection. It was found that, for Carbapenem-resistant Acinetobacter infection, ICU admission was a strong risk factor. It was seen that, out of the 75 Carbapenem-resistant Acinetobacter infected patients, 37 (49.3%), had been admitted to ICU. In the aforementioned study, there was a worse profile of patients with drug resistant Acinetobacter infection, but not with patients' outcomes. But the present study showed that outcomes of treatment and Carbapenem-resistance had a high significance.

In the study by Gurjar M et. al, it was seen that Carbapenem-resistant Acinetobacter infection with Ventilator Associated Pneumonia (VAP) acted as a strong risk factor for the former. Same was the result with the present study. But in this study, risk factors of Carbapenem-resistant Acinetobacter infected patients were compared with Carbapenem-sensitive Acinetobacter infection. Also, presence of pneumonia at ICU admission has an impact on the outcome of the patients, according to the mentioned study. In this study also, when pneumonia was taken as a factor, it proved to be a high- risk factor for both Carbapenem-sensitive and Carbapenem-resistant Acinetobacter infection.

In a study by Rebecca H Sunenshine et. al [5], first of its kind, that it directly assessed the outcomes of patients with drug-resistant Acinetobacter infection. But in the current study, the treatment outcomes of patients with Carbapenem-resistant Acinetobacter-infected patients were compared with Carbapenem-sensitive Acinetobacter-infected patients. It was seen that, patients of the former category improved after treatment but those of the latter category recovered completely.

So, all the above mentioned studies mostly assessed drug-resistant Acinetobacter infection or drug-sensitive Acinetobacter infection. But the two categories were never compared. The present study compared the two categories of patients, those with Carbapenem-resistant Acinetobacter infection and Carbapenem-sensitive Acinetobacter infection. The co-morbid conditions like cancer, CKD, etc. did act as strong risk factors for both the categories of patients. But bronchial asthma was a risk factor for only Carbapenem-resistant Acinetobacter-infected patients, as no patients were found in the study of 150 patients' records, where a patient had Carbapenem-sensitive Acinetobacter infection and bronchial asthma alongside. Previous studies [1] showed that DM was a risk factor for Acinetobacter infection. But, in the current study DM did not prove to be a risk factor for any of the two categories of patients.

CONCLUSION

Co-morbid conditions like cancer, CKD, ARDS, anemia, cor pulmonale, ets acted as risk factors for both Carbapenem-sensitive Acinetobacter-infected patients and Carbapenem-resistant Acinetobacter infected patients.

For patients infected by Acinetobacter that is resistant to Carbapenem, bronchial asthma is a risk factor.

ICU admission was a risk factor for both the categories of patients.

No importance was found in the number of days of hospital stay, number of antibiotics taken, or incidence of hospital-acquired and community-acquired infections in the two categories of patients.

Maximum patients with Acinetobacter infection that is resistant to Carbapenem recovered after treatment while maximum patients with Acinetobacter infection that is resistant to Carbapeneminfection recovered after treatment. So, the outcomes of treatment for the two categories of patients were different.

RECOMMENDATIONS

Patients with bronchial asthma should be looked after, specifically so that they don't acquire Carbapenem-resistant Acinetobacter infection. Prophylaxis can be an option, especially for those admitted to the ICU, or who are intubated, or getting mechanical ventilation or those who have tracheostomy done.

Patients with co-morbid conditions should be looked after specifically, so that they don't acquire Carbapenem-sensitive or Carbapenem-resistant Acinetobacter infection.

ICUs should be disinfected and monitoring of all patients in the ICU should be done for Acinetobacter infection (both Carbapenem-resistant and sensitive).

Monitoring (especially, culture and sensitivity) of intubated, mechanically ventilated patients for Acinetobacter infections should be done. Tracheal aspirates should also be cultured for Acinetobacter in tracheostomy patients.

Conflict of Interest – None

Source of Funding- Self Funded

Ethical Clearance - Ethical approval was obtained from the ethics committee of Institution Kasturba Medical College, Manipal Academy of Higher Education, located in Mangalore.

REFERENCES

1. Tonacio AC, Oliveira MS, Malbuisson LM, Levin AS. Trauma is associated with a better prognosis in intensive care patients with Acinetobacter infections. Infection. 2014 Feb;42(1):89-95.
2. Anderson DL. Sitafloxacin hydrate for bacterial infections. Drugs Today (Barc). 2008 Jul;44(7):489-501.
3. Avkan-Oguz V, Unek T, Firuzan E, Ozbılgın M, Egelı T, Bacakoglu A, Gulay Z, Astarcıoglu I. Bacterial Pathogens Isolated in Liver Transplant Recipients With Surgical Site Infection and Antibiotic Treatment. Transplant Proc. 2015 Jun;47(5):1495-8.
4. Mastoraki A, Douka E, Kriaras I, Stravopodis G, Saroglou G, Geroulanos S. Preventing strategy of multidrug-resistant Acinetobacter baumannii susceptible only to colistin in cardiac surgical intensive care units. Eur J Cardiothorac Surg. 2008 Jun;33(6):1086-90.
5. Multidrug-resistant Acinetobacter infection mortality rate and length of hospitalization. Sunenshine RH, Wright MO, Maragakis LL, Harris AD, Song X, Hebden J, Cosgrove SE, Anderson A, Carnell J, Jernigan DB, Kleinbaum DG, Perl TM, Standiford HC, Srinivasan A. Emerg Infect Dis. 2007 Jan;13(1):97-103

Gender Differences in Quality of Life in Type-2 Diabetics with Metabolic Syndrome

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ABSTRACT

BACKGROUND: Diabetes mellitus, a chronic metabolic disorder, may have a negative effect on the quality of life of diabetics.

AIM: To evaluate the gender differences in quality of life (QOL) of type-2 diabetics with metabolic syndrome (MS).

METHOD: The cross-sectional study was conducted at the outpatient clinic of a tertiary hospital in Madurai, on 166 type-2 diabetics with MS. Baseline characteristics, anthropometric measurements and biochemical profile were elicited through a pre-tested questionnaire. QOL of the diabetics was evaluated using the WHOQOL-BREF questionnaire. Gender comparisons were statistically tested.

RESULTS: The overall mean QOL scores were 28.08±6.95 and 32.35±12.08 for male and female diabetics respectively which differed significantly (P<0.001). Women diabetics had better perception of QOL compared to men.

CONCLUSIONS: QOL as reported by the diabetics was poor, with women scoring better than male diabetics.

Key-words: *Diabetes, Metabolic syndrome, Quality of Life, Gender*

INTRODUCTION

Type-2 diabetes mellitus is a complex, heterogeneous metabolic condition with serious short-term and long-term consequences[1]. Metabolic syndrome (MS) indicates a cluster of unfavourable health factors such as obesity, insulin resistance, dyslipidemia and hypertension that increase the risk of developing cardiovascular diseases, especially in type-2 diabetes[2, 3]. Metabolic syndrome is recognized as a reliable long-term predictor of adverse health outcomes[4]. The long-term complications of diabetes, with their considerable impact on health, may as a result also have a negative impact on quality of life.

Quality of life (QOL) is defined by WHO[5] as "individuals' perceptions of their position in life in the context of culture and value systems in which they live and in relation to their goals, expectations, standards and concerns". It is a broad ranging concept affected in a complex way by the person's physical health, psychological state, level of independence, social relationships, personal beliefs and their relationship to salient features of their environment.

SUBJECTS AND METHOD

The study was based on a cross-sectional representative sample of 1126 adult type-2 diabetics attending the outpatient clinic in Southern Tamil Nadu.

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The subjects were selected based on the inclusion criteria of being able to read the questionnaire and provide informed consent, were >18 years of age, diagnosed as suffering from type-2 diabetes mellitus for at least one year and an exclusion criteria of having severe co-morbidities or psychiatric disorder. Institutional ethical clearance was obtained for the study, conducted between April and October 2017. A pre-tested questionnaire was used to elicit information on the demographic and socio-economic profile of the subjects. Anthropometric measurements were obtained directly from the patients at the outpatient department and the biochemical data were collected from the hospital records. The definition of MS used in the study adhered to the National Cholesterol Control Program Adult Treatment Panel (NCEP ATP-III) definition modified for Asian Indians[6]: central obesity measured by waist circumference(WC) ≥90cm in men and ≥80cm in women; fasting plasma glucose(FPG) ≥100mg/dl or diagnosed with type-2 diabetes; hypertension with systolic BP≥130mmHg or diastolic BP≥85mmHg; elevated triglyceride level ≥150mg/dl; reduced HDL-cholesterol level <40mg/dl for men and <50mg/dl for women.

From the identified type-2 diabetics with MS, a sub-sample was chosen for the study on quality of life. The Tamil version of the WHOQOL-BREF questionnaire was used to facilitate better understanding by the respondents. Prior permission was obtained from WHO and the questionnaire was field tested for reliability. The WHOQOL-BREF questionnaire consists of 26 questions: two questions from the overall QOL and general health and 24 questions of satisfaction, divided into four domains: physical and psychological health, social relationships and environmental health. The response of each question was rated on a 5-point Likert scale and the raw scores in each domain were transformed to a 4 - 20 score according to WHO guidelines[7]. The mean score of questions in each domain was used to calculate the domain score that was finally transformed linearly to a 0-100 scale[8]. The total score and hence QOL was classified by the investigators as poor (<33), average (33-66) and good (>66).

Data Analysis

Data were analysed using SPSS version 22.0 for Windows (SPSS Inc., Chicago, USA). Based on normality test, all continuous data were found to be normally distributed and were presented as descriptive statistics i.e., mean and standard deviation, and gender comparisons using unpaired 't'test. The statistical significance was assumed at a p-value of <0.05. The level of correlation between the overall QOL scores and MS parameters was examined using Pearson's correlation coefficient. Independent t-test and chi-square test were used to investigate the relation between the QOL scores and baseline characteristics.

RESULTS

Prevalence of Metabolic Syndrome among the type-2 diabetics

The overall prevalence of metabolic syndrome among the type-2 diabetics (N=1126) was above three fourth (77.44%) of the sample population, higher among women (84.67%) as compared to men (72.40%). The sub-sample for QOL study was selected based on the presence of more than three positive parameters of MS. A sub-sample of 166 (14.74%) adult type-2 diabetics with metabolic syndrome **(92 female and 74 male)** were identified for the QOL study. The profile of the selected sub-sample of type-2 diabetics with metabolic syndrome is presented in the following table.

Table 1: Gender-wise comparison of MS components in type-2 diabetics with MS

Parameters		Female (n=92)	Male (n=74)	P value
		Mean±SD	Mean±SD	
Age	(yrs)	50.78±11.66	53.77±11.39	0.099
BMI	(kg/m^2)	28.73±4.54	27.16±4.002	0.021*
Waist Circumference	(cm)	96.75±9.84	81.34±9.81	P<0.001***
BP-Systolic	(mmHg)	144.34±19.18	140.27±14.14	0.130

Cont... **Table 1: Gender-wise comparison of MS components in type-2 diabetics with MS**

BP-Diastolic	(mmHg)	87.8±11.3	87.0±10.84	0.643
Fasting Plasma Glucose	(mg/dl)	188.9±61.5	198.22±66.52	0.352
LDL Cholesterol	(mg/dl)	132.04±38.43	119.29±42.02	0.043
HDL Cholesterol	(mg/dl)	38.68±5.03	33.51±2.95	P<0.001***
Triglycerides	(mg/dl)	255.88±98.48	265.97±121.93	0.556

*p<0.05 - Significant , **p<0.01 and ***p<0.001 highly significant.

The mean age of the subjects was comparable between genders. A mild significant difference (p=0.021) in BMI was noted between the male and female subjects. The mean WC of the male subjects was lower than the cut-off for men (P<0.001). Women diabetics had a higher mean WC and lower HDL level when compared to men which may explain the higher prevalence of MS in women. The mean values of parameters such as BP, FPG and TG were above the cut-off values as per MS definition and were comparable between genders.

The quality of life measure were tested for the reliability and the Cronbach's Alpha was 0.801 which well exceeds the minimum value of 0.70[9,10].

Gender comparison of association between overall QOL scores and baseline characteristics

Most of the male (59.5%) and female (65.2%) subjects were in the age range of 41 to 60 years and women in this age range had highest overall mean QOL scores (33.5±12.4) when compared with men (26.4±2.4). Men had higher mean QOL score (31.3±6.1) in the age range of 21 to 40 years when compared to women (29.3±11.6) in this age group. Marital status led to significant (P<0.001) difference in QOL scores within the male group. Most of the female (71.7%) and male (59.5%) subjects belonged to joint family which contributed to higher QOL scores. The QOL scores had no significant association with religion. A majority (64%) of the subjects in both genders had professional education and almost 42% of each gender group belonged to upper middle class.

Table 2: Comparison of overall QOL scores and demographic variables between genders

Parameters	**Overall Quality of Life scores within groups**					
	Female (n=92)		**P value**	**Male (n=74)**		**P value**
	n(%)	**Mean±SD**		**n(%)**	**Mean±SD**	
Age ≤20yrs	0	0	0.405	1(1.3)	58. ±0	P<0.001***
21-40yrs	18(19.6)	29.3±11.6		6(8.1)	31.3±6.1	
41-60yrs	60(65.2)	33.5±12.4		44(59.5)	26.4±2.4	
≥60yrs	14(15.2)	31.3±10.9		23(31.1)	29.2±9.5	
Marital Status			0.418			P<0.001***
Unmarried	0	0		2(2.7)	54.8±4.6	
Married	89(96.7)	32.2±12.1		69(93.2)	27.4±5.5	
Widowed	0	0		1(1.3)	28.3±0	
Divorced	2(2.17)	28±0		0	0	
Separated	1(1.08)	52±0		2(2.7)	25.8±3.2	
Family members			0.552			0.899
≤ 4 members	42(45.7)	31.5±11.9		29(39.2)	27.9±6.9	
> 4 members	50(54.3)	33.04±12		45(60.8)	28.2±7.1	

Cont... **Table 2: Comparison of overall QOL scores and demographic variables between genders**

Family type						
Joint	66(71.7)	33.7±13.3	0.081	44(59.5)	28.7±8.2	0.289
Nuclear	26(28.3)	28.9±7.6		30(40.5)	27.03±4.5	
Religion						
Hindu	66(71.7)	32.7±12.3	0.660	57(77.0)	28.3±7.82	0.783
Muslim	13(14.1)	29.5±9.4		10(13.5)	27±2.23	
Christian	13(14.1)	33.3±13.5		7(9.5)	27.1±2.43	
Education						
Middle school	9(9.8)	37.0±14.7	0.096	9(12.2)	25±4.36	0.315
Higher secondary	9(9.8)	38.6±17.8		6(8.1)	26.04±2.21	
UG/PG	15(16.3)	34.7±14.6		11(14.9)	30.3±8.0	
Professional	59(64.1)	30.1±9.4		48(64.8)	28.3±7.35	
Socio-Economic Status						
Lower	0	0	0.19	0	0	0.423
Upper Lower	23(25.0)	36.5±15.7		15(20.3)	26.2±4.45	
Lower Middle	24(26.1)	29.1±9.5		21(28.4)	29.7±9.5	
Upper Middle	39(42.4)	32.1±11.3		32(43.2)	28.2±6.47	
Upper	6(6.5)	30.7±6.56		6(8.1)	26.04±1.87	

Significant association was observed between QOL scores and age ($p<0.001$), marital status ($p<0.001$) and occupation ($p<0.05$) respectively in male subjects. This observation may explain the reason behind the low QOL scores among the male diabetics since QOL is a subjective measure, influenced by the dependent variables.

Comparison of mean QOL scores of each domain between genders

QOL scores of each domain were tested for significance using an independent sample t-test.

Table 3: Comparison of QOL domain scores between genders

QOL Domains	Gender(n)	Mean QOL scores	P value
Physical health	Male(74)	30.85±9.25	0.041*
	Female(92)	34.45±12.50	
Psychological health	Male(74)	34.17±7.58	0.02*
	Female(92)	37.47±10.45	
Social relationship	Male(74)	22.31±9.97	0.01*
	Female(92)	27.54±16.16	
Environment health	Male(74)	24.97±6.82	0.007**
	Female(92)	29.62±13.34	
Overall QOL	Male(74)	28.07±6.95	0.009**
	Female(92)	32.35±12.08	

Women diabetics had significantly higher scores than that of men within each domain. The highest score was obtained in the psychological domain and the lowest score for social relationships among both groups. Although a significant difference (P=0.009) was noted in the overall QOL scores between groups, the differences in the individual domain scores were not highly significant, except for the scores in the environment domain (P=0.007). The higher scores by women may be attributed to the younger age range when compared to men in the study group. Further, an equal percentage of women subjects had professional education compared to men, which may have contributed to their better perception of QOL.

A majority of male diabetics with MS had low levels of perception of quality of life in all domains while the women diabetics had better perception of QOL especially in variables such as physical and psychological health domains. Highest proportion (95.9%) of male subjects had poor perception of their social relationships, followed by 94.6% with poor scores in the environmental domain.

The correlation of quality of life scores with the individual parameters of MS was analysed using Pearson's correlation coefficient and the values were compared between genders. WC, BMI and TGL in male, and HDL and TGL in female subjects showed a positive correlation with QOL compared to the other parameters

of MS. Although WC was negatively correlated with QOL in female subjects, BMI showed negligible positive correlation. It may be inferred that the overall occurrence of MS had more impact on the QOL scores than individual parameters of MS.

DISCUSSION

The study aimed to compare the QOL of male and female type-2 diabetics with metabolic syndrome in a tertiary out-patient diabetic clinic. Metabolic syndrome was present in majority (77.44%) of the type-2 diabetics, also stated by various studies[11, 12, 13]. Women had a higher prevalence rate which maybe a result of difference in the cut-off values of individual parameters of MS [14, 15].

A majority of the male and female diabetics were in the age group of 41-60 years with a mean overall QOL score of 26.4±2.4 in men and 33.5±12.4 in female subjects. It is observed that younger type-2 diabetics had significantly higher QOL scores than older persons[16, 17]. However, a study embarked on an elderly population in a small town in Tamilnadu[18] showed a better mean QOL score. Association of QOL scores with marital status, exhibited in unmarried male subjects (2.7%) have negligible implication. It may be noted that QOL was not influenced by any specific demographic parameter in women. However, the QOL scores were significantly associated with age, marital status and occupation in male diabetics[18]. Among the MS parameters, WC and HDL had varying correlations with QOL scores for male and female subjects. Women diabetics had significantly higher waist circumference which may have influenced the negative correlation (r = -0.10) with QOL. HDL cholesterol had mild negative correlation in men (0.07). It was found that dyslipidemia had the lowest correlation with QOL[19]. Blood pressure was the only parameter that had similar negative correlations in both genders.

The individual domain QOL scores were significantly higher in women than among men diabetics in contrast to most findings [20, 21]. However, other studies support our observation of higher QOL in female than male diabetics [22, 23]. Both genders perceived lowest levels of QOL in the social domain followed by the environmental domain. This suggests that external factors exhibit greater influence on QOL of diabetics than their personal factors such as physical and psychological influences, irrespective of gender. Thus, diabetic individuals with MS were more likely to have poor scores in the domains of general health, vitality, social functioning and role limitations due to emotional problems. QOL can be enhanced among people with diabetes by interventions that improve glycaemic control, changes in insulin delivery systems, and educational and counselling sessions that support the development of diabetes specific coping skills[24].

Limitations:

In this study, sample was limited to diabetics with MS in a tertiary hospital and hence the findings cannot be generalised to populations. Diabetics without MS were not included in the study, therefore impact of MS in diabetes on QOL could not be compared. Other associated factors related to QOL, such as, behavioural characteristics, social wellbeing and environmental health were not included in the study owing to paucity of time

CONCLUSION

The cross-sectional study measures the burden of MS on type-2 diabetics and its effect on their quality of life. These findings suggest that MS as a constellation of conditions has a greater impact on QOL than the individual disorders. Quality of life of diabetics is a strong indicator of the patient care process, influenced by the available healthcare facilities, family support, social and environmental influences. Further, longitudinal studies are recommended to assess the effect of social and environmental factors on quality of life of diabetics.

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REFERENCES

1. Solli O, Stavem K & Kristiansen. Health-related quality of life in diabetes: The associations of complications with EQ-5D scores. Health and Quality of Life Outcomes. 2010;8:18.
2. Grundy SM, Cleeman JI, Merz NB, Brewer HB, Clark LT, Hunninghake DB, et al. Recent Clinical Trials and NCEP ATP III. JACC. 2004;44:720–32.
3. Simmons B. Clinical reasoning: concept analysis. Journal of Advanced Nursing. 2010;66:1151–1158.

4. Ford ES. Prevalence of the metabolic syndrome defined by the International Diabetes Federation among adults in the U.S. Diabetes Care. 2005;28:2745–2749.
5. The World Health Organization Quality of Life assessment (WHOQOL). Soc Sci Med. 1995;41(10).
6. Misra A, Chowbey PK, Makkar BM, Vikram NK, Wasir JS, Chadha, et.al. Consensus statement for diagnosis of obesity, abdominal obesity and the metabolic syndrome for Asian Indians and recommendations for physical activity, medical and surgical management. *J Assoc. Physicians India.* 2009;*57:*163–170.
7. WHOQOL-BREF Introduction, Administration, Scoring and Generic version of the Assessment: Field Trial Version, Programme on Mental Health, WHO, Geneva. 1996.
8. Power M, Bullinger M, Harper A. The World Health Organization WHOQOL-100: Tests of the universality of quality of life in 15 different cultural groups worldwide. Health Psychology. 1999;18:495-505.
9. Bland JM & Altman DG. Statistics notes: Cronbach's alpha. BMJ 1997;1:314572.
10. Nunnally JC, & Bernstein IH. Psychometric theory. McGraw-Hill.1994.
11. Jacob B, George AT, Antony TP, Jose R, Sebastian SR. Prevalence of metabolic syndrome in newly detected type 2 diabetes mellitus. Academic Medical Journal of India. 2015;29:8-12.
12. Surana SP, Shah DB, Gala K, Susheja S, Hoskote SS, Gill N, et al. Prevalence of metabolic syndrome in an urban Indian diabetic population using the NCEP ATPIII guidelines. J Assoc Physicians India. 2008;56:865-8.
13. Khuwaja AK, Ali FN, Naqvi I, Bux R, Jabbar A, Dhanani RH. Metabolic syndrome and its individual components among people with type 2 diabetes: Prevalence, gender differences and its association with ischemic heart disease. Journal of Diabetes Mellitus. 2012;2:332-337.
14. Dhanraj E, Bhamsali A, Jaggi S, Dutta P, Jain S, Tiwari P, et al. Prevalence and predictors of metabolic Syndrome in non-obese Asian Indians with newly detected type 2 diabetes mellitus. Indian Medical Association Journal. 2008;106:366-372.
15. Prasad DS, Kabir Z, Dash AK, Das BC. Prevalence and risk factors for metabolic syndrome in Asian Indians: A community study from urban Eastern India. J Cardiovasc Dis Res. 2012;3:204-11.
16. Gholami A, Jahromi LM, Zarei E & Dehghan A. Application of WHOQOL-BREF in Measuring Quality of Life in Health-Care Staff. International Journal of Preventive Medicine. 2013;4:809–817.
17. Glasgow RE, Ruggiero L, Eakin EG, Dryfoos J, Chobanian L. Quality of life and associated characteristics in a large national sample of adults with diabetes. Diabetes Care. 1997;20:562-7.
18. Sowmiya KR & Nagarani. A Study on Quality of Life of Elderly Population in Mettupalayam, a Rural Area of Tamilnadu. Nat. J. Res. Com. Med. 2012;1:123-177.
19. Miettola J, Niskanen LK, ViinamaKi H & Kumpusalo E. Metabolic syndrome is associated with self-perceived depression. Scandinavian J of Primary HealthCare. 2008;26:203-210.
20. Akinci G, Akinci B, Coskun S, Bayindir P, Hekimsoy Z & **Ö**zmen B. Hormones. 2008;7:156-162.
21. Moghadam BMH, Mohammad AA, Mazloumi SS, Saaidizadeh M. Quality of life in Diabetes Type II patients in Yazd. Journal of Shahid Sadoughi University of medical sciences and health services. 2007;14:49-54.
22. Monjamed Z, Ali AM, Mehran A & Peimani T. The quality of life in diabetic patients with chronic complications. Journal of HAYAT. 2006;12:92–92.
23. Ragonesi PD, Ragonesi G, Merati L & Taddei MT. The impact of diabetes mellitus on quality of life in elderly patients. Archives of Gerontology and Geriatrics. 1998;6:417–422.
24. Wexler DJ, Grant RW, Wittenberg E, Bosch JL, Cagliero E, Delahanty L, et al. Correlates of health-related quality of life in type 2 diabetes. Diabetologia. 2006;49:1489–1497.

Study on Role of Deviance Behaviour & Its Impact on Entrepreneurship

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ABSTRACT

Purpose - The purpose of this study is to explore relationship between entrepreneurship and deviant behavior.

Design - Conceptual development using cases as illustrative examples.

Findings- Clearly, deviant and unethical behavior issues are of surprising situation to companies, which need to find a way to determine m, on equivalent time as encouraging ethical culture. Feels that furthermore research is required using more qualitative and definitive estimations to research extra about one's practices.

Value- This study finds that there is an overlap between way deviant behavior is defined and way entrepreneurship is conceptualized in literature. It also finds that previous research, distinguishing between desirable and undesirable deviant behavior based on intentions or outcomes of behavior, insufficient in relation to entrepreneurship as deviant behavior. Reason is that for entrepreneurial ventures, underlying intentions are often good, but outcomes often not; and that making assessments of outcomes of entrepreneurial ventures a prior is notoriously difficult. Assessing deviant behavior based only on organizational level evaluations is likewise insufficient in relation to entrepreneurship.

Research limitations - The cases used to illustrate overlap between entrepreneurship and deviant behavior are conspicuous and not necessarily representative of entrepreneurship and deviant behavior in general.

Originality - This is an attempt at merging deviant behavior and entrepreneurship literature, which highlights an important niche with a great promise for future research.

Keywords — *Entrepreneurship, deviant behavior, Deviance, Norm and Institution.*

INTRODUCTION

Although deviant behavior is risky, it can also have positive consequences for organization, its members, or both. Research on positive consequences of deviant behavior is a neglected area of literature and requires further research. In order to develop previous conceptualizations of deviant behavior, this study draws on emerging strand of research that focuses on dark side of entrepreneurship and limited work that emphasizes positive aspects of deviant behavior as deviance and rule-breaking. In doing so, it explores links between entrepreneurship and deviant behavior theoretically and empirically.

We suggest that it is necessary to broaden view of which institutions determine whether a venture classifies as deviant behavior, when analyzing entrepreneurship. Reason for this is that support for venture may be needed also from actors outside of organization, and what constitutes relevant organization is not always clear. Therefore, we develop a framework for assessing entrepreneurship as deviant behavior based on reviewed literature. This framework captures potential inconsistencies in institutional frameworks by which behavior is assessed. In addition to se

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conceptual developments, study discusses links between entrepreneurship and deviant behavior and uses a number of noticeable instances of independent and corporate entrepreneurship in order to illustrate how institutional constraints affect entrepreneurial ventures. Lastly, we discuss study's findings and assess m critically and conclude with suggestions for further research.

What is Entrepreneurship?

Entrepreneurship has been defined in a myriad of ways not only by practitioners but also by academics. Perhaps archetypical description of entrepreneurship is a process where someone starts a firm, combining means of production and labor; process or output is novel.

More recent research has re-framed scope of entrepreneurship. In their seminal paper, Shane and Venkataraman defines entrepreneurial opportunities as ''those situations in which new goods, services, raw materials, and organizing methods can be introduced and sold at [a price] greater than their cost of production''[23]. They acknowledge that entrepreneurship occurs for reasons or than for profit, but limit their discussion to for-profit situation and to capitalist paradigm. In order to provide a more general definition of entrepreneurial opportunities, Davidson and Wiklund's discussion is helpful. In their view, entrepreneurship is about ''emergence of new economic activity''[9]. y highlighted that entrepreneurship takes place not only in new organizations, but also in existing organizations and in cooperation of less formal. Therefore, what separates entrepreneurial opportunities from opportunities in general, is that they are associated with emergence of new economic activity. Although Shane and Venkataraman's discourse[23] is framed in a capitalist paradigm and assumes legality, re is nothing, in principle, that prevents phenomena of opportunity recognition and exploitation from taking place in or settings.

Although most people have norms that roughly correspond to legal framework, in some respects norms, beliefs, and values of large groups in society deviate from laws and regulations. For example, using undocumented labor and sharing copyrighted files over Internet are examples of activities that are illegal (in most countries), but nevertheless deemed legitimate by large parts of population. Consequently, some entrepreneurial opportunities may exist and may be pursued in what Webb et al.[26] refer to as informal economy. Informal economy is part of economy that is illegal but considered legitimate by a large portion of population. Renegade entrepreneurs operate outside of both formal and informal institutions. Although Webb et al.[26] do not give a name to type of economy that is legal but considered illegitimate by large parts of population, activities falling into this category are clearly conceivable. For example, prostitution is legal in many countries, but is still considered illegitimate by large parts of population. We term this category offensive entrepreneurship. Separation between formal and informal types of entrepreneurship is likewise found within corporate entrepreneurship literature[27]. Corporate entrepreneurship denotes entrepreneurial processes within already established firms[24].Within this literature it is emphasized that entrepreneurial initiatives often originate from bottom-up processes [6,7,16]. At times se bottom-up ventures are informal, that is, y are not sanctioned formally by organization27.

As illustrated in Table 1, entrepreneurs can break norms or laws (or both) in their pursuit of entrepreneurial opportunities. In or words, entrepreneurial action (i.e., pursuing entrepreneurial opportunities) is only partly constrained by institutions[26]. In addition, strategies employed by entrepreneurs to respond to institutional pressures may influence very institutional framework in which y find themselves and their organizations[20]. Thus, some scholars use term institutional entrepreneurship in reference to entrepreneurial actions that reshape our institutional frameworks[1, 2]. Conspicuous firms like Ford, IKEA, and McDonalds have reshaped not only peoples' habits but also their view of reality[12]. However, se processes are not predictable. As humans are myopic to impact of their ventures in market place[19], they are even more so with regards to their impact on institutions[1, 2]. Of course, this has neither stopped people from starting firms, nor from trying to influence institutions. In or words, despite being unable to control and foresee outcome of their actions, entrepreneurs start ventures, which inevitably involve uncertainty[15] and great variance in outcomes[23]. As entrepreneurs strive to introduce new products, services, methods, or to reach new groups with existing ones, they often find themselves in conflict with existing norms and rules. These conflicts sometimes stifle entrepreneurial ventures, at or times redirect entrepreneurial effort[5] and sometimes lead to emergence of new institutions such as norms, rules, and laws.

Table-1. Typology of Entrepreneurship Based on

	Legality	
	Legal	Illegal
Legitimacy		
Legitimate	Formal entrepreneurship	Informal entrepreneurship
Illegitimate	Offensive entrepreneurship	Renegade Entrepreneurship

Institutional Trespassing

Deviant Behavior and Institutional Frameworks

This general framework (summarized in Table 2) allows for different types of deviant behavior depending on which institutions are trespassed against. Separating kind of institutions people can trespass against also removes blind spot created by a monolithic view of institutions. For example, where as Robinson and Bennett have argued that dumping toxic waste in a river should not be considered deviant behavior if organizational norms encourage such behavior, framework suggested in this study captures both unlawfulness and societal illegitimacy of such behavior[22]. In or words, this study's framework captures potential inconsistencies in institutional frameworks in which people exist.

In addition to misalignment of societal and organizational institutions, re may also be discrepancies between formal and informal institutions within same level of analysis (i.e., organizational or societal). Webb et al. highlight discrepancy between how large parts of population and people in some countries view sharing of copyrighted files[26]. Furthermore, within organizations, formal and informal institutions may be contradictory. Returning to toxic waste—it is unlikely today that formal rules of any organization would condone dumping, although informally norms may encourage it. In such cases, employees find m-selves between a rock and a hard place. Regardless of their actions, y will misbehave from some perspective. In fact, this discrepancy may be used as a buffer for managers, who, in case of external exposure, can blame particular employees who got caught.

Table-2. Institutions defining Deviant behavior.

	Type of Institution	
	Formal	Informal
Level		
Societal	Laws	Societal norms
Organizational	Rules	Organizational norms

Links between Entrepreneurship and Deviant Behavior

According to definitions provided above, entrepreneurship is deviant behavior if it involves trespassing against organizational or societal formal or informal institutions. Our definition of entrepreneurship makes distinction between entrepreneurial action and non-entrepreneurial action possible. Entrepreneurial actions are associated with pursuing entrepreneurial opportunities, which in turn are associated with emergence of new economic activity. Thus, seizing opportunity to steal cash or some products from organization is not entrepreneurship, where as seizing opportunity to produce a new type of product or finding a new use for old products is. Stealing cash from organization would fit neatly under wide deviant behavior umbrella, where as a new use for old products could be deviant behavior, but need not be necessarily. For example, reusing pace makers from dead people would not be in accordance with US institutions if reuse takes place in United States[21] and would therefore constitute both deviant behavior and entrepreneurship.

Recycling plastic bottles to produce fleece fabric, on other hand, would be entrepreneurship but not be deviant behavior as it would be in accordance with both formal and informal institutions. Therefore, according to definitions discussed in this study, re is a conceptual overlap between deviant behavior and entrepreneurship as some entrepreneurial ventures break rules and norms and Therefore qualify also as deviant behavior In addition to discussed conceptual overlap between entrepreneurship and deviant behavior, re is a range of potential empirical commonalities between two phenomena. Such commonalities can stem from organizational factors that enable both entrepreneurship and deviant behavior. For example, autonomy is positively

related to entrepreneurial behavior[17, 18], but it has also been found to be positively related to deviant behavior[25]. Consequently, attempts at supporting entrepreneurial behavior can unintentionally enable deviant behavior. Another source of overlap may be common characteristics of entrepreneurs and entrepreneurship. For example, Wright and Zahra portray entrepreneurs as rule breakers[27]; Klofsten, M claims that entrepreneurs are often suspicious of authority[14]; Johannisson that entrepreneurs frequently assume role of an anarchist in relation to existing institutional framework[12]; and Kramer, Cesinger, Schwarzinger, and Gelle´ri find that narcissism and psychopath are positively related to entrepreneurial intentions[17,18]. Furthermore, Shane draws upon a substantial body of research when he claims that many entrepreneurs are uninterested in working for ors[23]. However, successful business start-ups regularly employ people and consequently owner–managers often end up with substantial power over firm's employees. This power can corrupt and in doing so promote both deviant and harmful acts by entrepreneur. In order to exemplify how entrepreneurship can clash with existing norms and rules and how se clashes are viewed by entrepreneurs, managers, and society, we draw on some noticeable cases of entrepreneurship. These examples are all prominent and large-scale ventures that have been represented as controversial. They range from rather mild organizational deviant behavior, via examples involving both legal and social complications, to those that members of general public have branded outrageous deviant behavior. se examples are chosen because y are conspicuous and are Therefore not necessarily representative for entrepreneurship and deviant behavior in general.

Defending Project against Project Review Procedures

Ulcer drug – Losec – is most successful product developed by pharmaceutical group Astra. From its introduction in 1988 until expiry of patents, Astra had income from Losec as a mainstay. Still, while now competing with generic drugs, worldwide sales in 2010 amounted to almost $1 billion[4]. However, Losec was not developed as a consequence of corporate top management strategy nor even a continuously accepted development effort. In fact, it was developed in defiance of corporate management research portfolio norms, and development project was saved from premature termination five times between 1966 and 1984[10].

Innovating Social Networking to Find a Successful and Legal Solution

Like most or entrepreneurial ventures, idea behind internationally renowned social networking site Facebook developed during an extended period of time including experimentation and interaction with many people[14].

Some early experimentation started with Zuckerberg obtaining photos of female Harvard students from student Houses' online archives and creating website Facemash, where users could rate relative attractiveness of students based on their photos being presented two at a time. Also, representatives of Harvard female student associations sharply criticized site as Zuckerberg did not have permission from either those photographed or from organizations that stored files online. Entrepreneurial action is consequently based on illegal use of photos (violating copyright and violating individual privacy) and for purposes deemed unethical by Harvard administration and by a number of female students. Venture Facemash could thus qualify for label renegade entrepreneurship in terms of Table 1, and it violated all four types of institutions in Table 2. However, view of violation of social norms is not universal. Large amount of users at Harvard obviously did not see system as violating ir norms sufficiently to refrain from using it[11].

Innovating Sharing of Digitized Material in Legal Borderlands

Pirate Bay is one of world's largest sites facilitating file-sharing and, according to web information company Alexa's traffic ranking, 75th most accessed website in world[3]. Unlike our or examples, it was intended to be controversial, as an active part of anti-copyright movement. It is an Internet site upon which general public can post and follow links, called Torrent files or, more recently, Magnet links, which direct users to chunks of another file, potentially allowing m to download it. Because site does not itself contain copyrighted material, it is likely that it was legal when it was first founded. However, after a change in law, a Swedish court deemed founders to be guilty of facilitating copyright infringement, a sentence they have appealed. Pirate Bay was an example of legal entrepreneurship when it first started, but ceased to be legal after a change in law and current court rulings.

Monetizing Healthcare Too Far

Like Pirate Bay, our final example is played out in an area where public opinion is divided. However, unlike entrepreneurs in Pirate Bay case, entrepreneurs behind for-profit healthcare provider Capio, did not wish to provoke opponents or upset feelings. Capio Group, with annual sales of approximately 1,100 million EUR, comprises about 60 operating units with some 9,000 employees and operates in Sweden, Norway, France, Germany, and United Kingdom. In Sweden, firm has been one of front runners in establishing for-profit care and healthcare when politicians started to allow such ventures to expand. Capio's official ambition is to be healthcare provider that best fulfills demands imposed by patients, public healthcare, companies, and organizations. In order to fulfill that ambition, they claim to focus on high-quality and effective care services and place individual patient's needs and expectations in center[8].

DISCUSSION

From a purely analytical perspective, most entrepreneurship could be viewed as deviant behavior, if we hold that entrepreneurship involves breaking of habits, norms, or rules[12, 27] and that ventures expose organization hosting m to risk because of their uncertain outcomes [1,2,26]. As illustrated by examples in preceding section, most ventures of any importance have proponents and opponents, and assessments of character of entrepreneurial ventures tend to differ between people and over time. For example, Ostholm's persistence in pursuing development of Losec in face of corporate top management opposition and in violation of standard evaluation rules in pharmaceutical group breached corporate institutions. However, in retrospect, when Ostholm's faith in research path and subsequent drug turned out to be warranted, success silenced concerns, and few would any longer view it as a case of deviant behavior, even if y did before success became evident.

Similarly, Zuckerberg's early defiance of norms appears more forgivable given subsequent success of Facebook. Had he quenched his entrepreneurial urge after Facemash, those who had learned about his actions would probably have considered m as offensive or even renegade entrepreneurship.

Pirate Bay intentionally challenged laws and pro-copyright norms, championing free-content norms pervasive in parts of society. By launching themselves into a contested area, it was obvious that there would be people condoning and people condemning their venture. This case illustrates how public opinion was influenced by relationship between law making, case, and people's own behavior and positions. Swedish voted Pirate Party into European parliament, partly in protest against changes in law that strengthened position of copyright holders and decreased individual's right to privacy.

Capio case, finally, illustrates how actions of individual entrepreneurs can influence proponents of general principles. In Sweden, re has been a political divide between those proposing that for-profit operation can help vitalize healthcare sector and make it more efficient, and those who maintain that it is unethical to make money from peoples' need for care and treatment.[6]

As illustrated by these examples, rather than being objective and static, assessment of entrepreneurship as deviant behavior depends on perspective of assessor, which in turn can change over time and both influence and be influenced by laws and societal norms. Judgment of where entrepreneurship is deviant behavior rests on people's emotional and moral assessment of venture. This judgment is influenced, but not determined, by (assumed) intentions of entrepreneurs and/or noted consequences, and relations to or acts.

An important risk in this regard is that successful ventures end up in entrepreneurship literature and unsuccessful ones in deviant behavior literature. Losec case is not unique. In fact, entrepreneurship literature highlights informal nature of many entrepreneurial ventures in existing organizations [6, 7, 16, 27]. However, deviant behavior literature tends to omit successful ventures as post hoc evaluations tend to be skewed by outcomes. For example, development of laptop computer by Toshiba, mentioned earlier, was a clear example of both deviant behavior and entrepreneurship. However, it ends up in entrepreneurship literature and not in deviant behavior literature.

Another issue in assessment of deviant behavior is that of organizational versus societal norms. In a start-up, norms will be built around entrepreneur's idea (l) s, and are thus highly unlikely to clash with entrepreneurial venture. For entrepreneurs acting in existing firms, on or hand, re will be established norms, rules, and routines that, at least to some extent, can be expected to be

compromised by entrepreneurial venture. Indeed, if no such clashes occurred, venture would hardly qualify as entrepreneurial. Entrepreneurial venture might or might not clash with societal norms surrounding organization.

CONCLUSION

In this attempt to explore entrepreneurship as deviant behavior, this study has suggested that entrepreneurship is often in conflict with organizational and societal institutions, such as norms and rules. In fact, we have found that re is an overlap between definitions of deviant behavior and conceptualizations of entrepreneurship in previous literature. In addition, study has found previous research, distinguishing between desirable and undesirable deviant behavior based on intentions or outcomes of behavior, insufficient in relation to entrepreneurship as deviant behavior. Reason is that for entrepreneurial ventures, underlying intentions are often good, but outcomes are often not[1, 2, 19]; and that making assessments of outcomes of entrepreneurial ventures a priori is notoriously. Assessing deviant behavior based only on organizational level evaluations[22] is likewise insufficient in relation to entrepreneurship. Reason for this is that support for venture may be needed also from actors outside of organization. Furthermore, what constitutes organization is not always clear. Therefore, we argue that it is necessary to broaden view of what institutions determine where a venture classifies as deviant behavior when analyzing entrepreneurship. Doing so highlights frequent inconsistencies between various institutions' assessments. Such inconsistencies can put employees in situations where they have to choose which institutions to trespass against. In this regard, exiting organization to pursue venture elsewhere is not a guarantee against being classified as deviant behavior. Considering emphasis that entrepreneurship literature puts on informal nature of many entrepreneurial ventures within existing organizations[16, 23] and lack of research on deviant behavior with positive consequences overlap between entrepreneurship and deviant behavior seems to be fertile ground for future research.

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REFERENCES

1. Aldrich, H. E. Beam me up, Scott (ie): Institutional theorists' struggle with emergent nature of entrepreneurship. Research in sociology of work Bingley, UK: Emerald Group Publishing. 2010;
2. Aldrich, H. E. Heroes, villains, and fools: Institutional entrepreneurship, not institutional entrepreneurs. Entrepreneurship Research Journal 2011; 1(2): doi:10.2202/2157-5665.1024.
3. Alexa traffic ranking. Statistics regarding pirate bay. http://www.alexa.com/siteinfo/piratebay.org (accessed 25 January 2012).
4. AstraZeneca. How does health connect us all? Annual Report and Form 20-F Information 2010, 2011; AstraZeneca, London.
5. Baumol, W. J. Entrepreneurship: Productive, unproductive and destructive. Journal of Political Economy 1990; 98(3).
6. Burgelman, R. A. A process model of internal corporate venturing in diversified major firm. Administrative Science Quarterly 1983; 28(2).
7. Burgelman, R. A., & Grove, A. S. Let chaos reign, then rein in chaos – Repeatedly: Managing strategic dynamics for corporate longevity. Strategic Management Journal 2007; 28(10).
8. Capio. Capio: About us. http://www.capio.com/en/Start/About-Capio (accessed 01 August 2012).
9. Davidsson, P., & Wiklund, J. Levels of analysis in entrepreneurship research: Current research practice and suggestions for the future. Entrepreneurship Theory and Practice 2001; 25(4).
10. Eliasson, G., & Eliasson, A. The pharmaceutical and biotechnological competence bloc and the development of Losec. Technological systems and industrial dynamics 1997; 6(1).
11. Facebook Team. Facebook statistics. http://www.facebook.com/press/info.php?statistics (accessed 25 September 2012).
12. Johannisson, B. Enacting entrepreneurship: Using auto-ethnography to study organisation creation. Paper presented at the Conference of Ethnographic Organisational Studies, University of St. Gallen, St. Gallen, Switzerland. 2002;
13. Kantharia, B. K., Patel, S. S., Kulkarni, G., Shah, A. N., Lokhandwala, Y., Mascarenhasf, E., &

Mascarenhas, D. A. N. Reuse of explanted permanent pacemakers donated by funeral homes. The American Journal of Cardiology 2011; 109(2).

14. Klofsten, M. New venture ideas: An analysis of their origin and early development. Technology Analysis & Strategic Management 2005; 17(1).
15. Knight, F. H. Risk, uncertainty and profit. (ed). Beard Books, Washington, DC; 2002.
16. Kuratko, D. F., & Golds, M. G. Corporate entrepreneurs or rogue middle managers? A framework for ethical corporate entrepreneurship. Journal of Business Ethics 2004; 55(1).
17. Lumpkin, G. T., & Dess, G. clarifying the entrepreneurial orientation construct and linking it to performance. Academy of Management Review 1996; 21(1).
18. Lumpkin, G. T., Cogliser, C. C., & Schneider, D. R. Understanding and measuring autonomy: An entrepreneurial orientation perspective. Entrepreneurship Theory and Practice 2009; 33(1).
19. Lundmark, E., & Westelius, A. Entrepreneurship as elixir and mutagen. In Entrepreneurship Theory and Practice 2009.
20. Oliver, C. Strategic responses to institutional processes. Academy of Management Review 1991; 16(1).
21. Ramqvist, P. Begagnad pacemaker blir som ny i Indien [Online in Swedish ‘‘Reused pacemaker good as new in India’’]. http://www.dn.se (accessed 08 December).
22. Robinson, S. L., & Bennett, R. J. A typology of deviant workplace behaviours: A multidimensional scaling study. Academy of Management Journal 1995; 38(2).
23. Shane, S., & Venkataraman, S. The promise of entrepreneurship as a field of research. Academy of Management Review 2000; 25(1).
24. Sharma, P., & Chrisman, J. J. Toward a reconciliation of the definitional issues in the field of corporate entrepreneurship. Entrepreneurship Theory and Practice 1999; 23(4).
25. Vardi, Y., & Weitz, E. Personal and positional antecedents of organizational deviant behaviour. Deviant behaviour and dysfunctional attitudes in organizations, Basingstoke, UK: Palgrave Macmillan 2003.
26. Webb, J. W., Tihanyi, L., Ireland, R. D., & Sirmon, D. G. You say illegal, I say legitimate: Entrepreneurship in the informal economy. Academy of Management, 2005; 34(3).
27. Zahra, S. A. Predictors and financial outcomes of corporate entrepreneurship: An exploratory study. Journal of Business Venturing 1991; 6(4).

Serodiagnosis of Listeriosis among Pregnant women and Neonates using a Rapid Serological Assay

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ABSTRACT

Background: Listeriosis a serious food-borne illness, most often affects pregnant women, the unborn, newborns and the immunocompromised .Infection in pregnant women results in intrauterine infection ,preterm labor, spontaneous abortion, still birth and neonatal meningitis/ sepsis leading to high morbidity and mortality .The present study aimed to detect human listeria antibody in pregnant women and neonates visiting Government general hospital, Puducherry, India using a rapid serological assay (ELISA).

Study Design: A cross sectional study.

Method: A total of 269 samples which includes 125 serum samples from pregnant women , 34 serum samples from women with bad obstetric history , 91 serum samples from neonates and 19 CSF samples from neonates collected were tested for Human Listeria Antibody IgM (LST-IgM) ELISA.

Results: Out of 269 cases tested 51 (19.0 %) were found positive for listeria antibody. Of the 125 pregnant women tested 43 (34.4%) were seropositive, Among the 34 women with bad obstetric history 7 (20.6%) and of the 110 neonatal cases only 1(0.93%) case showed seropositive for Listeria antibody.16/34 (47.1%) of pregnant women in first trimester, 5/18(27.8%) women with preterm labor were reported seropositive for Listeria.35/51 (68.6%) of seropositive cases had only fever.

Conclusion: The overall seropositivity of Listeriosis in pregnant women and neonates was to the tune of 19.0%. To conclude any pregnant women with a fever or flu like symptoms with or without gastrointestinal symptoms needs to be diagnosed for Listeriosis. Moreover Listeriosis being a foodborne infection, information regarding avoidance of certain foods in Pregnancy can be incorporated into formal antenatal education in addition pregnant women need to be cautioned regarding the feto-maternal consequences of Listeriosis infection in pregnancy.

Keywords : *Seroprevalence, Listeria, Pregnancy, newborns.*

INTRODUCTION

Listeriosis a serious emerging food-borne illness most commonly caused by the ubiquitous gram-positive organism *Listeria spp*[1]. L. monocytogenes is of major concern as it accounts for about 98% of human Listeriosis cases[2]. Pregnant women, newborns infants, immunocompromised individuals and geriatric population are high-risk groups primarily affected with Listeriosis than healthy individuals[3]. Listeriosis infection in pregnancy can lead to intrauterine infection resulting in severe complications such as preterm labor, spontaneous abortion, still birth and neonatal infection / neonatal meningitis/ sepsis resulting in high morbidity

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and mortality [4,5]. There has been global increase in incidence of Listeriosis from foods and humans mainly due to widespread use of refrigerated foods, consumption of processed foods and the long shelf-life of foods [6,7]. In India most often the naturally occurring cases of human Listeriosis is unrecognized or unexposed mainly due to lack of rapid, suitable and a reliable diagnostic tool. Moreover reports on Listeriosis in humans are very few mainly because of failure to isolate the pathogen ,due to its rarity or lack of awareness or low incidence rate or many a times its been missed owing to lack of identification [8]. Many Conventional serological / serodiagnostic assays have been used for screening the animal and human Listeriosis cases employing the somatic(O), flagellar (H) and L. monocytogenes-specific ELISAs [9], more recently the serodiagnosis of Listeriosis has been improved by the introduction of assays for the detection of antibodies in serum [10]. Listeriosis incidence in pregnancy has been reported 18 times greater than in the general population. Moreover Listeriosis infection in pregnancy shows poor prognosis for fetuses [6,11]. With the increasing industrialization, changing food habits, drug resistance, non-availability of suitable vaccine, capability of this bacterium to survive at refrigeration temperature and its case fatality rate [12].Considering all the above mentioned facts and the zoonotic nature of this pathogen the present study aimed to detect the seroprevalence of *Listeriosis* among pregnant women and neonates visiting Government general hospital, Puducherry, India.

METHOD

A cross-sectional study conducted over a period of 1 year from June 2014 to May 2015 in the Department of Microbiology, Sri Lakshmi Narayana Medical College, Hospital and Government General Hospital, Puducherry, India. This study was approved by the Institutional Human Ethics Committee and Informed consent was obtained from all participants included in the study. In order to accomplish the objective a total of 269 samples collected from pregnant women and neonates were analyzed for detection of antibodies to listeria by enzyme linked immunosorbent assay (ELISA) which includes 125 serum samples from pregnant women, 34 serum samples from women with bad obstetric history, 91 serum samples from neonates and 19 CSF samples from neonates collected were screened for seroprevalence of Listeriosis using qualitative human listeria antibody IgM (LST-IgM) ELISA kit- marketed by My BioSource Cat.No.MBS109141. Study design and study population includes 250 blood samples collected from pregnant women, neonates and women with bad obstetric history presented with either diarrheal or flu like symptoms or symptoms of sepsis. All blood samples collected were centrifuged at 3000 rpm for 20 minutes for collection of serum and stored at -20^{o}C until processed. 19 CSF samples were collected from neonates with clinical presentation of meningitis/ meningoencephalitis / encephalitis were centrifuged at 3000 rpm for 20 minutes. The particulates were removed and the supernatant was stored at -20^{o}C until processed. The ELISA for qualitative detection of human listeria antibody was performed using (LST-IgM) ELISA kit- marketed by My BioSource Cat. No.MBS109141 , the Optical Density (OD) value was measured and the results were interpreted according to manufactures instructions.

RESULT

In the present study attempt has been made to detect the seroprevalence of Listeriosis among pregnant women and neonates. Further attempts have also been made to analyze the clinical condition with the seropositivity potentials. A total of 269 symptomatic pregnant women and neonates were screened for detection of antibodies against Listeria. From (Table No. 1) it is evident that out of 269 cases screened 51 (19.0%) showed seropositivity for Listeria. (Table No. 2) shows the category of patients screened for Listeria antibody. Out of 125 pregnant women tested 43 (34.4%) were seropositive. The seroprevalence among women with bad obstetric history was 7 (20.6%) and of the 110 neonates tested only 1 case (0.9%) showed seropositive for Listeria. From (Table No. 3) it is evident that out of 34 pregnant women in first trimester who were tested 16 (47.1%) of cases were found seropositive for Listeria. Among the 35 pregnant women in second trimester who were tested only 5 (14.3%) showed seropositivity and of the 38 pregnant women in third trimester screened 15 (39.5%) were reported positive for listeria antibody. 5 out of 18 women (27.8%) who had preterm labor were found seropositive for Listeria antibody and 7out of 34 (20.6%) women who had miscarriage/ spontaneous abortion showed seropositive. Among the 86 neonates who had early onset sepsis only 1 (1.2%) case showed seropositive for Listeria antibody and out of 24 neonates who had late onset sepsis none were found positive for listeria antibody (Table No.3). Comparison of seropositive cases with clinical symptoms is given in (Table No.4)

Among the 51 seropositive cases reported in this study nearly 35 cases (68.6%) had only fever and 14 (27.5%) cases had symptoms of fever and diarrhea. Only 1 (1.9%) case who had symptoms of sepsis were found seropositive and one case (1.9%) who also had symptoms of sepsis and meningitis were found seropositive to listeria.

Table No.1 : Overall seroprevalence of Listeriosis in Pregnant women and neonates

No. of cases	No. positive	% Percentage
269	51	19.0%

Table No.2: Distribution of Listeria seropositive cases.

Patient category	No. of cases	No. of cases positive for Listerial antibody	% positive
Pregnant women	125	43	34.4
Women with bad obstetric history	34	7	20.6
Neonates	110	1	0.9

Table No.3: Analysis of Listeria seropositivity cases.

Category	No. of cases	No. of seropositive cases (%)
Pregnant women in first trimester	34	16 (47.1%)
Pregnant women in second trimester	35	5 (14.3%)
Pregnant women in third trimester	38	15 (39.5%)
Preterm labor	18	5 (27.8%)
Miscarriage/ Spontaneous abortion	34	7(20.6%)
Early onset sepsis	86	1 (1.2%)
Late onset sepsis	24	0 (0%)

Table No.5: Comparison of Listeria positive cases with clinical symptoms.

Clinical symptoms	No. of seropositive cases (%)n=51
Only fever	35(68.6%)
Fever + diarrhea	14 (27.5%)
Fever + sepsis	1 (1.9%)
Fever + meningitis	0 (0%)
Fever + diarrhea + sepsis	0 (0%)
Fever + meningitis + sepsis	1 (1.9%)
Fever + meningitis + diarrhoea	0 (0%)
Fever + meningitis + diarrhea + sepsis	0 (0%)

DISCUSSION

The study on seroprevalence of Listeriosis among preganant women and neonates revealed seropositivity for listeria antibody to the tune of 51 (19.0%) by (LST-IgM) ELISA. This finding is endorsed by several studies [13,14,15] ; nearly 16-27% of all *Listeria* infections has been reported in pregnant women [6,14]. The seroprevalence of Listeriosis in neonates was very low in the present study, it was to the tune of 0.9%. Similar observation has been made in a study from North India were the incidence of neonatal Listeriosis was reported as 0.2% in total births and 2.2% in meconium stained babies [16,17]. Similarly reports on Perinatal Listeriosis prevalence varies between 8.6 and 17.4/100,000 of live births [11,18]. The present study reveals close association of pregnant women and neonates with seroprevalance against Listeriosis which also indicates the presence of this bacterium in the food chain. Listeriosis being a food borne illness steps must be taken to prevent pregnant women from consumption of food known to be at higher risk of contamination with *Listeria*.

A total of 34.4% of pregnant women and 20.6% of women with bad obstetric history were found to be seropositive for Listeriosis. The results are well correlated with a study carried out by Krishna et al. in 1966 who reported 14 % Listeriosis in 150 cases with poor obstetric history in Mumbai[19]. Whereas the results of the present study was quiet higher when compared to studies carried out in India by Bhujwala et al. in 1973 who reported 3% of listeriosis in women with bad obstetric history from Delhi [20] . In another study 1.34 % screened were positive for listeria [21]. The reasons for the recent increase in pregnancy-associated Listeriosis could include the poor food hygiene practices, the pathogen, environmental and host factors [6,22]. Serodiagnosis being a quick method of detection could be employed for cases with high clinical suspicion[2]. In the present study pregnant women in first trimester showed higher seropositivity 47.1% followed by pregnant women in third trimester 39.5%. Most of the earlier studies have reported higher incidence in third trimester [6,23,24] . In the present study 14.3% of pregnant women in second trimester was found seropositive to Listeria. Mylonakis et al., in 2002 in their study reported out of 11 cases 2 pregnant women in the second trimester with *Listeria* infection ended in a spontaneous abortion[25]. Pregnancy- associated Listeriosis can occur at any stage of gestation , though widely reported or detected in the third trimester [6,23].In this study 27.8% of women who had preterm labor were tested seropositive for listeria and 20.6% of women who had spontaneous abortion or miscarriage showed seropositivity to Listeria. Earlier studies have reported 1 of 5 pregnancies with Listeriosis infection results in stillbirth or spontaneous abortion and poor prognosis in early pregnancy [6].Giraud et al in 1973 reported Listeriosis infection in 2.1% miscarriages and in 1.6% of cases with preterm births or spontaneous abortions [26]. Only one neonate out of 86 cases with early onset sepsis was found seropositive for Listeriosis. Since there more chance of preterm delivery and abortion in pregnancy associated Listeriosis, differential diagnosis of Listeriosis in pregnant woman should be considered [7].

Pregnant women are at high risk for Listeriosis, but symptoms are non-specific and diagnosis is difficult [19]. In the present study nearly 68.6% of listeria seropositive cases presented only with fever and 27.5% presented with fever and diarrhea. In a study on 191 cases of Listeriosis in pregnancy 32% of women had symptoms of a flu-like illness, 65% had only fever and only 7% had vomiting/diarrhea. Diagnosis of maternal Listeriosis is difficult due to the lack of GI symptoms generally associated with food-borne pathogens [6,14,25] and Fever is the most common symptom reported in several studies [27] .Investigation and treatment of any women during antenatal period presenting with either fever or flu like symptoms, with or without GI symptoms for Listeriosis is essential in order to prevent fetal loss, stillbirth , preterm labor, neonatal sepsis and meningitis [7,14] . This study mandates the awareness for diagnosis / detection of pregnancy associated Listeriosis among obstetricians.

CONCLUSION

In the present study the overall seroprevalence of Listeriosis among pregnant women and neonates was 19.0% which was found to be higher. Further research is required to establish the causes for the current increase in pregnancy associated Listeriosis. 34.4% of pregnant women and 20.6% of women with spontaneous abortion/ miscarriage showed seropositivity to Listeriosis. About 47.6% of pregnant women in first trimester were found seropositive for Listeriosis and 27.8% of women who had preterm labor were positive for Listeria antibody. Hence this study concludes that a high index of clinical suspicion is a required for the diagnosis of maternal Listeriosis, which may occur at any stages in pregnancy. A close collaboration among obstetrician, pediatrician,

microbiologists and epidemiologists is needed to investigate the increasing epidemiology of Listeriosis and to modulate the signs and symptoms of this infection.

Ethical Clearance- Institution Ethics committee (Human studies): No. IEc/c- P/40/2014

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REFERENCES

1. Farber JM, Peterkin PI. Listeria monocytogenes, a food-borne pathogen. Microbiological reviews. 1991 Sep 1;55(3):476-511.
2. Suryawanshi RD, Jayarao B, Barbuddhe SB, Chaudhari SP, Rawool DB, Mohan V, Vergis J, Negi M, Malik SV. Seropositivity of Field Veterinarians for Listeric Infection by Indirect ELISAs Employing Recombinant and Wild–Type Listeriolysin O. Advances in Animal and Veterinary Sciences. 2014 Jul 29;2(5S):17-21.
3. Broome CV. Listeriosis. JAMA. 1989;26(1):13.
4. Johnston WH, Morton SA, Wong MH, Roy TE. Septicaemia of the newborn due to Listeria monocytogenes. Canadian Medical Association Journal. 1955 Sep 1;73(5):402.
5. Vázquez-Boland JA, Kuhn M, Berche P, Chakraborty T, Domínguez-Bernal G, Goebel W, González-Zorn B, Wehland J, Kreft J. Listeria pathogenesis and molecular virulence determinants. Clinical microbiology reviews. 2001 Jul 1;14(3):584-640.
6. Lamont RF, Sobel J, Mazaki-Tovi S, Kusanovic JP, Vaisbuch E, Kim SK, Uldbjerg N, Romero R. Listeriosis in human pregnancy: a systematic review. Journal of perinatal medicine. 2011 May 1;39(3):227-36.
7. Awofisayo A, Amar C, Ruggles R, Elson R, Adak GK, Mook P, Grant KA. Pregnancy-associated listeriosis in England and Wales–CORRIGENDUM. Epidemiology & Infection. 2015 Jan;143(2):257-.
8. Hernandez-Milian A, Payeras-Cifre A. What is new in listeriosis?. BioMed research international. 2014;2014.
9. Chen SC, Chang TC. Identification of Listeria monocytogenes based on the detection of a 68-kilodalton cell-surface antigen. Journal of food protection. 1996 Nov;59(11):1176-81.
10. Geoffroy CL, Gaillard JL, Alouf JE, Berche PA. Purification, characterization, and toxicity of the sulfhydryl-activated hemolysin listeriolysin O from Listeria monocytogenes. Infection and immunity. 1987 Jul 1;55(7):1641-6.
11. Southwick FS, Purich DL. Intracellular pathogenesis of listeriosis. New England Journal of Medicine. 1996 Mar 21;334(12):770-6.
12. Liu D. Identification, subtyping and virulence determination of Listeria monocytogenes, an important foodborne pathogen. Journal of medical microbiology. 2006 Jun 1;55(6):645-59.
13. Jackson KA, Iwamoto M, Swerdlow D. Pregnancy-associated listeriosis. Epidemiology & Infection. 2010 Oct;138(10):1503-9.
14. Janakiraman V. Listeriosis in pregnancy: diagnosis, treatment, and prevention. Reviews in Obstetrics and Gynecology. 2008;1(4):179.
15. Voetsch AC, Angulo FJ, Jones TF, Moore MR, Nadon C, McCarthy P, Shiferaw B, Megginson MB, Hurd S, Anderson BJ, Cronquist A. Reduction in the incidence of invasive listeriosis in foodborne diseases active surveillance network sites, 1996–2003. Clinical Infectious Diseases. 2007 Feb 15;44(4):513-20.
16. Thomas S, Verma IC, Singh M, Bhujwala RA. Study of neonatal listeriosis in north India. Indian Journal of Medical Research. 1981;73:28-32.
17. Mokta KK, Kanga AK, Kaushal RK. Neonatal listeriosis: a case report from sub-Himalayas. Indian journal of medical microbiology. 2010 Oct 1;28(4):385
18. Tappero JW, Schuchat A, Deaver KA, Mascola L, Wenger JD, Swaminathan B, Hayes PS, Graves LM, Reeves MW, Weaver RE, Rothrock G. Reduction in the incidence of human listeriosis in the United States: effectiveness of prevention efforts?. Jama. 1995 Apr 12;273(14):1118-22.
19. Krishna U, Desai MW, Daftary VG. Listeriosis: a clinico-bacteriological study. Journal of Obstetrics and Gynecology of India. 1966;16:304-10.
20. Bhujwala RA, Hingorani V, Chandra RK. Genital listeriosis in Delhi (India): a pilot study. The Indian journal of medical research. 1973 Sep;61(9):1284.
21. Bhujwala RA, Hingorani V. Perinatal listeriosis: a bacteriological and serological study. The Indian

journal of medical research. 1975 Oct;63(10):1503.

22. Khatamzas E, Hughes H, Grant KA, McLauchlin J, Bowler IC. The increasing prevalence of listeriosis—what are we missing?. QJM: An International Journal of Medicine. 2009 Dec 30;103(7):519-22.
23. Mateus T, Silva J, Maia RL, Teixeira P. Listeriosis during pregnancy: a public health concern. ISRN obstetrics and gynecology. 2013 Sep 26;2013.
24. Bortolussi R, McGregor DD, Kongshavn PA, Galsworthy S, Albritton W, Davies JW, Seeliger HP. Host defense mechanisms to perinatal and neonatal Listeria monocytogenes infection. Pathology and Immunopathology Research. 1984;3(4):311-32.
25. Mylonakis E, Paliou M, Hohmann EL, Calderwood SB, Wing EJ. Listeriosis during pregnancy: a case series and review of 222 cases. Medicine. 2002 Jul 1;81(4):260-9.
26. Giraud JR, Denis F, Gargot F, Fizazi T, Babin P, Rautlin DD, Hoppeler A, Brisou J. Listeriosis. Occurrence in spontaneous interruptions of pregnancy. La Nouvelle presse medicale. 1973 Jan;2(4):215-8.
27. Benshushan A, Tsafrir A, Arbel R, Rahav G, Ariel I, Rojansky N. Listeria infection during pregnancy: a 10 year experience. IMAJ-RAMAT GAN-. 2002 Oct 1;4(10):776-80.

A Study on Quality of Life (QOL), Stress and Coping among Wives of Alcohol Dependence Syndrome (ADS) Clients Admitted in Selected Hospitals of Udupi District

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ABSTRACT

Background: Alcohol related deaths and death due to disease related to alcoholism are major concerns in India. Persistent use of alcohol not only affects the individual but also the spouse who faces stressful life events and emotional problems **Aim:** The study aimed to determine the Quality of life, stress and coping among wives of alcohol dependent clients and to find the relationship among them. **Settings and Design:** The study was conducted in selected tertiary care hospitals of Udupi district with descriptive survey approach. A total of 60 wives of alcohol dependent individuals were selected based on nonprobability sampling. **Materials and method:** Stress rating scale, Coping scale and BREF-QOL by WHO were used to collect the data. **Statistical analysis used:** Karl Pearson coefficient of correlation was used with the help of SPSS 16 version. **Results and conclusions**: The obtained WHOQOL-BREF scores were converted to WHOQOL-100 for all the domains. The mean score for the physical domain was 22.05±10.51. The psychological domain and social relations domain got a score of 24.63 ± 10.44 and 84.45 ± 19.48 respectively, whereas the environment domain got a mean score of 16.53 ± 8.50. The relationship between domains of quality of life and stress showed that physical domain *(r= -0.524, p<0.001)* psychological domain *(r =-0.527, p<0.001),* social relations *(r= -0.460, p<0.001)* and environmental domain (*r =-0.480 p<0.001*) have a moderate negative correlation. No statistical relationship was found between quality of life and coping, though a low positive correlation exists (*r=.265, p=.041*) between physical health and withdrawal coping.

Keywords*: Alcohol dependent syndrome, stress, coping, quality of life*

INTRODUCTION

Alcohol was an inherent part of the human culture for many years. Before the modern era the fermented alcohol was available in tribal and village societies where it was consumed traditionally in an occasional manner [1]. During early modern industrialization the production and consumption of the alcohol changed drastically and replaced the traditional patterns of drinking [2]. Distilled spirit was available and marketing strategies were developed and implemented in the same period. The consequences of this were catastrophes in various part of the world by causing substantial social and health problem.

Alcohol is considered as a psychoactive substance with properties of producing dependence [3]. Alcohol use disorders are one of the major leading causes of disability in many countries [4] and it is not just a health problem; it is a social and public health problem which can have an adverse impact on the family involved in care giving [5].

The recent WHO data showed that the total per capita consumption of alcohol was 6.2 litres of pure alcohol per year and 13.5 grams of pure alcohol per person per day. The Global data of consumption of alcohol showed that 50.1% was consumed in the form of spirits, 34.8%

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was consumed in the form of beer. This resulted in approximately 3.3 million deaths each year [6].

Alcohol related deaths and death due to disease related to alcoholism are major concerns of developing countries. In India, every year 3.3 million deaths attributed to alcohol consumption that puts her in a precarious score of 4 out of 5 in the 'Years of life lost scale' which means that a large number of people lost their lives in the early stages due to alcohol consumption and fell out [7].

Indian drinking habits were greatly different from state to state. During the period of 1992-2012, the per capita consumption of alcohol has increased to the third highest in the world by 55%, after Russian Federation and Estonia [8]. Persistent use of alcohol not only affects the individual but also affects the family members, especially the spouse who faces stressful life events and emotional problems. The effects of substance abuse frequently extend beyond the limit of spouse and children. The feelings of anger, abandonment, anxiety, concern, embarrassment, fear and guilt may be experienced in the extended family members [9].Female partner of male alcoholic suffers from various stressors due to the alcohol dependence. The psychological consequences of this include denial or protection of the male partner with the hopelessness, neglected health, shame, stigma and isolation. The wife of a person abusing substances is likely to protect the children and assume parenting duties that are not fulfilled by the husband who abuses substances [9].

The female partners of the alcoholics show maladaptive behaviour as a reaction to stress [10]. The common coping behaviour reported were avoidance, discord, indulgence and fearful withdrawal while marital breakdown, taking special action, assertion and sexual withdrawal [11].The female partners of the alcoholics are exposed to high rates of domestic violence which include physical, verbal and sexual abuse. [12]. The marital dissatisfaction, high economic burden, poor familial and social support are some other major issues faced by the spouses of alcoholics [13] [14]. To decrease the burden and improve the coping skills and quality of life of the spouses of clients with the alcohol dependence syndrome, a thorough understanding of their various issues are essential.

On this background, the study was designed with the following objectives:

1. To determine the quality of life, stress and coping among wives of Alcohol-dependent patients

2. To find the relationship between quality of life, stress and coping

3. To find the association between quality of life, stress, coping and selected variables.

MATERIALS AND METHOD

Sixty wives of clients diagnosed with Alcoholic Dependence Syndrome admitted in selected psychiatric wards of tertiary care hospitals of Udupi district were included in the study by non-probability convenient sampling. The participants were selected based on the criteria such as the ability to read any one the languages -Kannada, English and Malayalam, age within 20-65 years and living with the Alcohol dependent person for the past one year.

The study proposal was submitted to the ethical committee members of Kasturba hospital, Manipal and ethical clearance were sought. Permission was also taken from the administrators of the institutions from where the subjects were selected. On the days of data collection, the researchers introduced themselves and the purpose of the study was explained to the subjects and written consent was taken. After ensuring the confidentiality a written consent was taken from the participants who were willing to participate in the study.

The data collection materials are described below.

Background Proforma:

The researchers developed the background proforma to get details from the participants as well as their spouse. It has two sections, the first section with eight items was used to collect the details from the wives of alcohol dependent person and the second section with nine items was used to collect data from alcohol dependent persons.

World Health Organization Quality of Life (WHOQOL)

The World Health Organization Quality of Life (WHOQOL) [15] was used to determine the quality of life of the spouse of the alcoholic dependent person. It is a 5 point Likert rating scale of 26 items with forward and

reverse scoring. . Also, two items from the Overall Quality of Life and General Health facet have been included, among which question one asks about an individual's overall perception of quality of life and question two asks about an individual's overall perception of their health. It has four domains namely physical health, psychological, social-relationship and environment. The four domain scores denote an individual's perception of quality of life in each particular domain.

Stress Rating Scale

The researchers developed the Stress rating Scale to measure the stress of the wives of clients with the alcohol dependence syndrome. It is a 33 item Likert scale and with responses as never, rarely, sometimes and always. The reliability of the tool was done with Chronbach alpha (α=.872) and found to be reliable. The maximum possible score is 99 which is arbitrarily classified into "No stress" (0-33), moderate stress (34-66) and severe stress (67-99).

Coping Scale

It is a standardized tool with 30 items [16]. The maximum possible score is 90. The scale also includes three subscales namely "Engaged coping", "Tolerant coping" and "Withdrawal coping".

RESULTS

Data were analyzed using Statistical Package for Social Sciences (SPSS) version 16. SPSS Inc software. Descriptive statistics included the mean and standard deviation for quantitative variables. The Karl Pearson coefficient of correlation was used to determine the relationship between the quality of life, stress and coping. The Chi-square test was also used to determine the association between the quality of life, stress, coping and selected variables.

Socio-demographic characteristics of wives of alcohol dependent clients

The data regarding the socio demographic characteristics of the participants showed that 91.7% of the wives of alcoholic dependent clients belong to Hindu religion and the majority of the participants ie,61.7 % were living in a nuclear family. Majority of the wives ie,60% were living with the alcoholic dependent husband for 11 to 40 years.

Socio-demographic characteristics of alcohol dependent individual

The age of the men who were admitted for de-addiction was ranged between 28 and 59 years with the mean age being 42 ± 7 years. Most of the participants were having primary education and self-employed. Many participants history of the previous admission for de-addiction, 30.0% of them were admitted once and 26.70% were admitted two times. Twenty percent of the participants had been admitted for more than 2 times in the de addiction centres. Twenty-one percent of them have the habit of drinking alcohol once every day where as 55% drank thrice or more than three times a day. The mean age at which they had their first drink was 26 ± 8 years with a range of 12 to 56 years.

Quality of life

The mean score obtained for WHOQOL- BREF domain 1 –physical- was 7.5 with a standard deviation of 1.68 which was later converted into WHOQOL-100 with a mean score of 22.05 and standard deviation of 10.51. Similarly mean score of domain 2 -psychological domain- was computed (18.27±10.29) and later converted into WHOQOL-100 (24.63±10.44).

Domain 3- social relations- got a mean score of 17.51 ± 3.11 was converted into 84.45 ± 19.48. Environment domain got a mean score of 10.00 ± 1.37 was later converted into 16.53 ± 8.50.

Stress

The wives of alcoholic patients with ADS had a mean stress score of 53.8 ± 17.12 with a minimum score of 2 and a maximum score of 83. Majority of the participants ie, 36 (60%) showed moderate stress and 16 (26.67%) showed severe stress.

Coping

The coping ability of the wives of patients with alcohol dependence syndrome showed a mean of 46.48 with a standard deviation of 15.68. The subscale analysis showed that the mean score of "Engaged coping" and "Tolerant coping" is 23.05 ±7.75 and 13.41 ± 5.74 respectively. Meanwhile "Withdrawal coping" showed a mean of 11.45 ± 3.20. When comparing the coping strategies 44.32 % is "Engaged coping", 49.69% is tolerant coping and 63.61% is withdrawal coping.

Relationship among quality of life, stress and coping among wives of alcohol dependent individual

To assess the relations between quality of life, stress and coping among wives of alcohol dependent patients, Karl Pearson coefficient of correlation was calculated with alpha set at 0.05 for each calculation. The relationship between quality of life and stress among wives of alcoholic dependent individual showed a moderate negative relationship *(r =-0.575 p<0.001)*. The relationship between domains of quality of life and stress showed that physical domain *(r = -0.524 p<0.001),* psychological domain *(r =-0.527 p<0.001),* social relations *(-0.460 p<0.001)* and environmental domain (*r =-0.480 p<0.001*) have a moderate negative correlation with stress.

The correlation analysis also found that there is no statistical relationship between quality of life and coping, though a low positive correlation (*r=.265, p=.041*) is observed between withdrawal coping and physical health (domain 1) of quality of life. No significant relationship between stress and coping was found.

DISCUSSION

In the present study, the researchers found that the majority of wives of patients with alcohol dependence had moderate stress. Severe stress among them was found to be 26.67% and this was in accordance with a clinical study which showed that 26% female spouses living with lifetime at-risk male drinkers have psychological distress [17]. The wives also experienced more life stressors and had lower mental/psychological quality-of-life and show a significant relationship with the substance use among their partners [18]

The present study revealed that physical domain (*r* = -0.524 p<0.001), psychological domain (*r =-0.527 p<0.001)*, social relations *(-0.460 p<0.001)* and environmental domain (*r =-0.480 p<0.001*) had a moderate negative correlation. The relationship between coping and stress showed that there was no significant correlation exists between them. This was contradictory to the findings of a study conducted at Chennai where there was a positive correlation between the level of stress and coping strategies among the wives of alcoholics(*r = .312)* showed that there was a high statistical significant at *p <0.01* level [19].Also, the spouses of alcoholic patients may benefit from coping skills training to deal with these situations.

CONCLUSION

This study brings light to the stressful lives of spouses of alcohol dependence syndrome patients. There is a need for continuous and sustained support from family, community and health care professionals to remove the alcohol abuse, strengthen the coping abilities and Quality of life of spouses.

Conflict of Interest : Authors declared that there is no conflict of interest

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REFERENCES

1. Gumede VM. Alcohol use and abuse in South Africa: A socio-medical problem. 1995.
2. Jernigan DH. Applying commodity chain analysis to changing modes of alcohol supply in a developing. Addiction. 2000; 95: p. 465–75.
3. WHO. http://www.who.int/. [Online].; 2015 [cited 2016 May 10. Available from: http://www.who.int/mediacentre/factsheets/fs349/en/.
4. Lim SS, Vos T, Flaxman AD, Danaei G, Shibuya K, Adair-Rohani H, et al. A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010. Lancet. 2012 December 15; 380(9859): p. 2224-60.
5. Kaur D, Ajinkya S. Psychological impact of adult alcoholism on spouses and children. Med J DY Patil Univ. 2014;(7): p. 124-7.
6. WHO. Global status report on alcohol and health 2014. Luxembourg; 2014.
7. WHO. World Health Organization. [Online]; 2012 [cited 2016 May 11. Available from: http://apps.who.int/gho/data/view.main.53660.
8. OECD. Tackling Harmful Alcohol Use: Economics and Public Health Policy Sassi F, editor.: OECD Publishers; 2015.
9. Center for Substance Abuse Treatment. Substance abuse treatment and family therapy. treatment improvement protocol (TIP) Series, No. 39. DHHS Publication No. (SMA) 04-3957: Substance Abuse and Mental Health Services Administration; 2004.

10. Jackson JK. The adjustment of the family to the crisis of alcoholism. Quarterly Journal of Studies of Alcohol. 1954; 15: p. 562-86.
11. Rao TS, Kuruvila K. A study on the coping behaviours of wives of alcoholics. Indian Journal of Psychiatry. 1992; 34(4): p. 359–365.
12. Mphi M. Female alcoholism problems in Lesotho. Addiction. 1994; 89: p. 945–9.
13. Epstein E, McCrady B, Hirsch L. Marital functioning in early versus late-onset alcoholic couples. Alcohol Clin Exp Res. 1997;: p. 547–56.
14. Bhowmick P, Tripathi B, Jhingan H, Pandey R. Social support, coping resources and codependence in spouses of individuals with alcohol and drug dependence. Indian J Psychiatry. 2001;(43): p. 219–24.
15. WHO. World Health Organization. [Online].; 2002. Available from: http://www.who.int/mental_health/publications/whoqol/en/.
16. Oxford J, Templeton L, Velleman R, Copello A. Family members of relatives with alcohol, drug and gambling problems: a set of standardized questionnaires for assessing stress, coping and strain. Addiction. 2005; 100: p. 1611-1624.
17. Tempiera R, Boyerb R, Lambert J. Psychological distress among female spouses of male at-risk drinkers. Alcohol. 2006; 40(1): p. 41-49.
18. Dawson DA, Grant BF, Chou SP, Stinson FS. The impact of partner alcohol problems on women's physical and mental health. Journal of studies on alcohol and drugs. 2007 Jan;68(1):66-75.
19. Devi GC, Rajasekar, Kokilavani N. A study to assess the level of stress and coping strategies among wives of alcoholics at selected settings, Chennai, Tamil Nadu. International Journal of Nursing Education and Research. 2013; 1(1).

Four Vital Capacity Breaths Can Delay the Onset of Haemoglobin Desaturation Following Nasopharyngeal Oxygen Insufflation

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ABSTRACT

Introduction. Prolonged apnoea occurring during endotracheal intubation leads to a fall in oxygen saturation. Preoxygenation helps in delaying the onset of fall in saturation

Aim The aim of the study was to determine whether insufflation of oxygen via a nasopharyngeal catheter would prolong the duration of apnoea (fall in SpO_2<95%) after preoxygenation with 4 vital capacity breaths.

Methods and materials Patients were divided into two groups of 20 each. Group 'case' received additional insufflation with oxygen during the period of apnoea while Group 'control' did not. O_2 saturation was monitored during the period of apnoea and the study was terminated with a fall in O_2 saturation to 95%, following which patients were ventilated.

Results Time to fall in SpO_2 to 95% in group 'case' was 6 mins (360 seconds) compared to group 'control' which was 4.1 mins (246 seconds) with a P value <0.05. The rise in $EtCO_2$ in Group case was 16.6 mm of Hg as compared to the 11.7 mm of Hg rise in the Group control during the apnoeic period which was attributed to longer period of apnoea. The average rise in the $EtCO_2$ per minute during the period of apnoea was 2.8mm of Hg.

Conclusion Thus we concluded that nasopharyngeal O_2 insufflation during the period of apnoea, after preoxygenation with 4 VC breaths, does delay the onset of O_2 desaturation during apnoea and can be used as an effective tool in difficult airway management.

Keywords: *saturation, apnoeic diffusion, difficult airway, preoxygenation, end tidal carbon dioxide*

INTRODUCTION

Until the airway has been secured, an Anesthesiologist, is frequently faced with the challenging task of maintaining adequate arterial oxygenation in apnoeic patients, after the induction of general anesthesia and muscle relaxation. While this is less likely to be a major factor while dealing with normal healthy individuals, pregnancy[1] and obese individuals[2] tend to desaturate faster during the period of apnoea. Before critical haemoglobin desaturation sets in, preoxygenation has long been proven to help in prolongation of the duration of apnoea [3, 4,5]. Preoxygenation fills the functional residual capacity with oxygen, thus increasing the patients' oxygen reserves. Preoxygenation using tidal volume breathing for three minutes has been shown to be far superior to the four vital capacity breath technique in prolonging the duration of apnoea[6, 7, & 8.] Holmdahl in 1956 [9] introduced the term Apnoeic Diffusion Oxygenation [9]. This was achieved by preoxygenation with 100% oxygen followed by oxygen insufflations during the subsequent apnoeic period. He proposed the fact that during apnoea, oxygen was extracted from the alveoli (functional residual capacity) at the rate of 250

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ml/minute, which is the basal oxygen consumption. CO_2 being highly soluble in the blood, is added to the alveoli at a meager 10 ml/minute. This causes the functional residual capacity to decrease to the rate of 240ml/minute. The ambient gases were drawn en masse into the lungs[9], at this sub atmospheric pressure. If oxygen were to be insufflated into the nasopharynx, this oxygen would be drawn in en masse thus maintaining the oxygen content of the functional residual capacity, which would help maintain PaO_2 of blood for a longer period during subsequent apnoea as compared to en masse diffusion of ambient air, the nitrogen content of which would further dilute the existing stores. The functional residual capacity body weight ratio was inversely proportional to the rate of nitrogen accumulation. This is based on the term introduced by Holmdahl in 1956 known as *apnoeic diffusion oxygenation*[8].Apnoeic diffusion oxygenation is defined as the en masse diffusion of oxygen into the lungs during apnoea following preoxygenation and nasopharyngeal oxygen insufflation. Thus onset of haemoglobin desaturation[4] is delayed by the insufflation of oxygen via a nasopharyngeal catheter as shown in **Figure 1**.

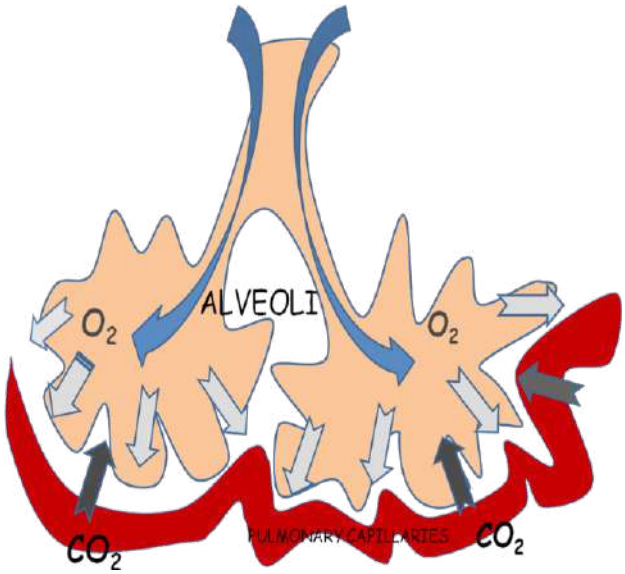

Figure 1. *En Masse* **diffusion of gases during apnoea as proposed by Holmdahl in 1956. The white arrows indicate the uptake of oxygen (at the rate of 250ml/minute). The grey arrows indicate the carbon-di-oxide release from the pulmonary capillaries into the alveoli (at the rate of 10ml/minute). A net deficit of 240ml/minute occurs in the alveoli and this leads to the development of a sub atmospheric pressure in the alveoli. This causes the ambient gases to diffuse** *en masse* **into the lungs, which is represented by the blue arrows.**

The objectives of this study were to

Study the effect of nasopharyngeal oxygen insufflation, in the presence of an open airway, following preoxygenation by four vital capacity breath technique.

To study the duration of apnoea which is defined as time from stopping preoxygenation to fall in SpO_2<95% or 6 minutes of apnoea.

The rise in end tidal carbon dioxide ($EtCO_2$) following apnoea and the effect of the duration of apnoea on the end tidal carbon dioxide.

METHOD AND MATERIALS

This was a prospective observational study conducted after obtaining approval for the study from the Institutional Human Ethics committee and an informed consent was obtained from all patients. The study was performed on 40 patients of American society of Anesthesiologists (ASA) physical status 1 and 2 with an age range of 20-50 years scheduled for elective surgery under general anesthesia. All the patients who refused, had difficult airway predictors, had upper or lower respiratory tract infections, chronic disease of the airways or history of allergies were excluded from the study. Patients were assigned to one of the two groups, being the group 'control' who did not receive nasal oxygen insufflation during the period of apnoea following preoxygenation and group 'case' being the group receiving nasal insufflation. All patients were assessed by a detailed history, general physical and systemic examination with appropriate investigations. On the day of surgery, an infusion of ringer lactate solution was started in the recovery room. Patient was explained previously the face mask breathing and the four vital capacity breath preoxygenation technique. The study patients were monitored using electrocardiography, non-invasive blood pressure monitoring, pulse oximetry and end tidal capnography ($EtCO_2$). Baseline vitals were noted. The patient was preoxygenated with 8 L/min oxygen using four vital capacity breaths in 30 seconds using a well fitted face mask. Anesthesia was induced using inj. fentanyl 2µg/kg IV, inj. Propofol 2mg/kg IV and neuromuscular blockade was achieved with inj. rocuronium 0.6mg/kg i.v. Boluses of Propofol 10mg was administered two minutes after the induction dose and then every one-minute to avoid awareness in patients. With the disappearance of the carbon dioxide waveform, which indicated onset of apnoea, the face mask was removed. A 10 Fr catheter was inserted nasally into the nasopharynx after measuring the length of the catheter

from the distance between the angle of the mouth and the tragus of the ipsilateral ear. In group case (n=20) oxygen was insufflated at the rate of 5L/minute via the nasopharyngeal catheter and in group control no oxygen was used. The time from the onset of apnoea which was identified by the disappearance of the carbon dioxide waveform to the fall in SpO_2 to 95% was recorded. Apnoea was allowed to continue till SpO_2 either fell to 95% or apnoea of 6 minutes' duration had occurred, after which the patient were ventilated using 100% oxygen, and tracheal intubation using direct laryngoscopy was performed. Inspired oxygen (FiO_2), $EtCO_2$ after four deep breaths and on initiation of positive pressure ventilation were recorded using a gas monitor.

Statistical Analysis

To determine the number of subjects required for the study a power analysis was conducted. For data analysis, we considered that a 5% change in oxygen saturation was clinically significant. We also considered Type I and Type II errors of 5% and 15 %, respectively (With 95% confidence interval and power of 85%). From a previous study, we determined that the standard deviation of oxygen saturation was 1.15% as such, the power analysis indicated that at least 17 patients were needed in each group. Student's t-test was used for statistical analysis (SPSS 10.0 for Windows Software).

Data are expressed in Frequency, Percentage, and Mean & Standard deviation. The inferential associations and comparisons between different parameters were done using Chi Square Test which was used as the non-parametric test. Student's t test was used to compare the mean value between 2 groups. To compare different groups with each other, non-parametric Mann Whitney's U test was employed. For all statistical evaluations, a two tailed probability 'p' value of < 0.05 was considered significant.

RESULTS

From Table 1 it is observed that the patients in both the groups were comparable with regard to the demographic data as no significant difference was observed between these two groups with respect to the age, sex, weight, height and ASA physical status.

Table 1. Demographic Data and ASA physical status

	Control (N=20)	Cases (N=20)	
Age in years	35.4 ± 10.1	32.9 ± 8.2	p=0.407
Weight in kgs	60.7 ± 8.6	55.9 ± 5.5	p=0.055
Height in cms	168.4 ± 8.9	163.5 ± 6.2	p=0.058
Sex M:F	11:9	8:12	p=.342
ASA physical status I:II	20:0	18:2	p= 0.147

Table 2 shows the time to the onset of apnoea in the two groups after the administration of rocuronium. This was indicated by the loss of chest wall movements clinically and by the loss of the $EtCO_2$ tracing on capnograph

Table 2. Time to onset of apnoea

	Group	N	Mean (seconds)	p
Time to apnoea	Case	20	24.5 ± 4.1	0.543
	Control	20	25.2 ± 3.0	

Data are presented as mean ± SD

The SpO_2 values obtained initially and at the onset of apnoea showed no statistical significance as seen in figure 2. Thus indicating that the saturation in the two groups were identical prior to the onset of apnoea. The SpO_2 obtained in the first minute after the onset of apnoea was similar. However, from the second minute onwards there was a statistically significant difference occurred in the SpO_2 values between the groups only and this increased in significance in the subsequent duration of the study, with the maximum difference observed in the third minute of the study.

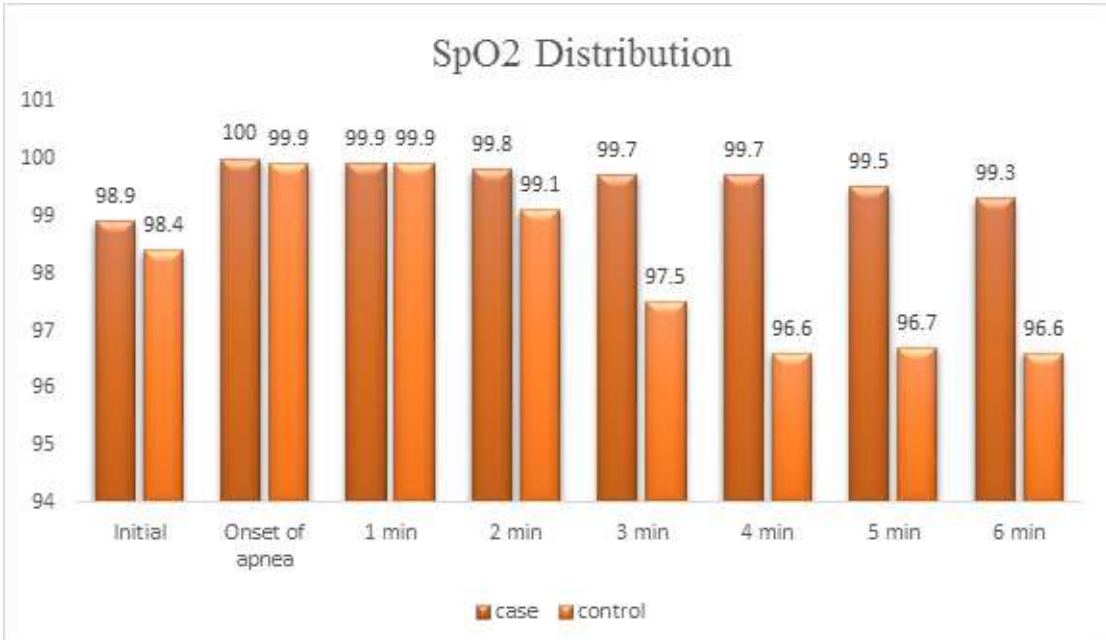

Figure 2. Distribution of oxygen saturation

Figure 3 shows the graphical representation of the rise in the $EtCO_2$ during the period of apnoea. The rise in the case group was 16.6 mm of Hg as compared to the 11.7 mm of Hg rise in the control group during the apnoeic period (p of 0.013). The average rise in the $EtCO_2$ per minute during the period of apnoea was 2.8mm of Hg, and this is comparable to the results obtained by Baraka et al.[8]

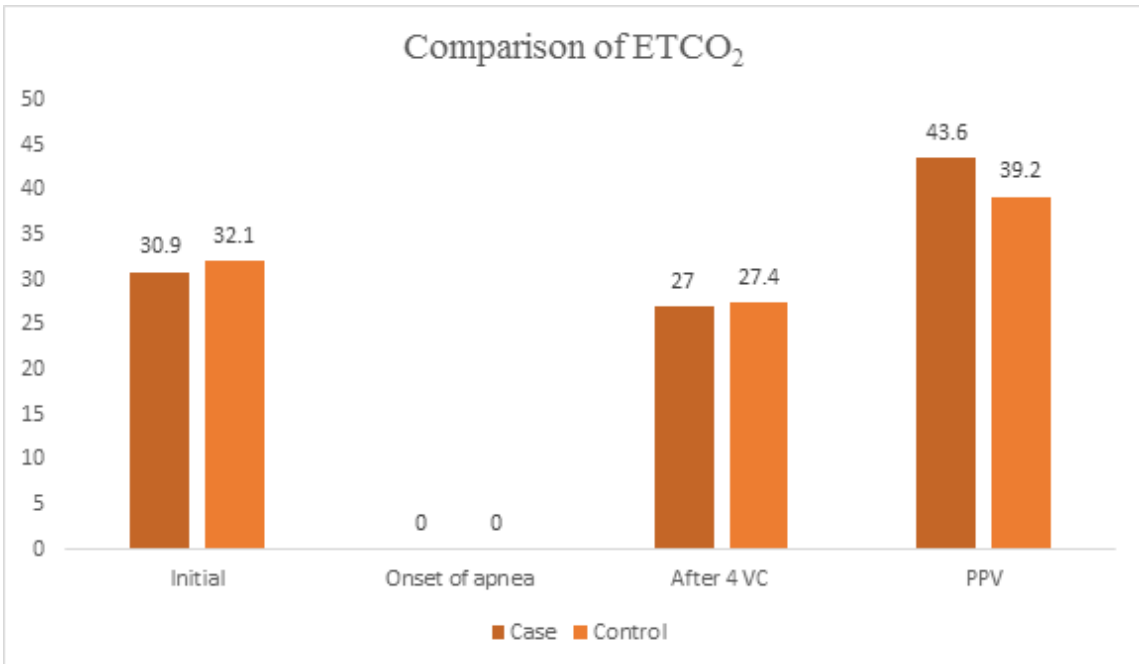

Figure 3. Rise in the End tidal carbon dioxide during apnoea time

DISCUSSION

The present study proved that nasopharyngeal insufflation of oxygen after preoxygenation with the four vital capacity breaths, during the period of apnoea can significantly delay the onset of Hb desaturation in an apnoeic patient, which is after the induction of anesthesia and muscle relaxation.

Delay in the onset of hypoxemia after nasal oxygen insufflation, in preoxygenated patients, has numerous applications such as in difficult mask ventilation in

patients with craniofacial anomalies. Insufflation of oxygen can provide additional time for laryngoscopy should tracheal intubation be difficult. Otolaryngologists can safely be provided with a minimum of 10 minutes to visualize the airway[4], unimpeded by the presence of ET tubes or patients' respiratory movements. However, the fact that insufflation always postpones the development of hypoxemia[10] suggests that this qualitative finding may be applicable to most preoxygenated patients whose airways remain patent between the alveoli and the pharynx.

The present study showed that patients in both groups were comparable with regard to age, weight, height and sex and involved ASA grade physical status 1 & 2 patients, and thus the quantitative data of this study are only applicable to such patients**.**

The SpO_2 after the four vital capacity breaths was 100% and was similar to the findings of Valentine et al [11]. This was comparable to the O_2 saturation produced by 3-minute tidal volume ventilation[12,13]. The duration of apnoea was comparatively shorter, even though the preoxygenation by the four vital capacity breath technique produced comparable PaO_2 and O_2 content to that produced by 5-minute tidal volume ventilation, as demonstrated by Norris in 1985 [14]. The reasons being, in the four vital capacity breath technique the minute ventilation far exceeds the FGF of 10ltrs/min, which leads to rebreathing. This in turn causes the dilution of the FRC by nitrogen content of air which in turn decreases the O_2 stores in the FRC. Hamilton et al [15] demonstrated that at flows of 10 liters/min, at 28$\pm$6.9sec the nitrogen content of the FRC was 30% and this reduced to 5% at 144$\pm$24sec.The four vital capacity breath technique causes faster desaturation as it requires a longer duration for tissue and venous compartments to fill with oxygen than while breathing room air. If the sum of the alveolar, arterial and tissue compartments is considered, they collectively can store 1200ml and 800ml, from the end of the first half minute and 60 seconds to 180 seconds respectively [13]. This is worth 3 to 4 minutes of O_2 consumption. Thus pre oxygenation using the four vital capacity breaths technique is considered to be inferior to tidal volume ventilation with the eight vital capacity breaths in 60 seconds [16,17]. However, in case of emergency when the five-minute tidal volume ventilation cannot be applied, such as in obstetric emergencies[1] or in critically ill patients [10], nasopharyngeal O_2 insufflation would help delay the onset of haemoglobin desaturation and provide added safety time of desaturation free apnoea till the trachea is secured.

The FiO_2 and the SpO_2 were not significantly different in both groups following the preoxygenation with the four vital capacity breath technique. Following the onset of apnoea, the SpO_2 values recorded in the first minute of the study was similar in both groups. However, from the second minute onwards, the fall in the oxygen saturation in the control group was significant with the maximum fall occurring in the third minute after the onset of apnoea**.** This indicated that the oxygen stores provide by the four vital capacity breath technique was sufficient to provide for a maximum period of 246 seconds when considering a haemoglobin desaturation to 95%. The results of the present study contrasted with those obtained by Baraka et al[8]. Baraka et al obtained a mean time of 219 seconds. This could be explained by the absence of uniformity in the monitoring equipment used and also do to the use of fingertip pulse oximetry in the present study.

The case group was able to maintain SpO_2 in excess of 99% for 360 seconds at which the study was terminated, indicating that nasopharyngeal insufflation of oxygen was capable of prolonging the duration of desaturation free apnoea to a significant extent This occurred due to the en masse diffusion of the insufflated gases from the nasopharynx into the lower respiratory tract due to the development of a sub atmospheric pressure in the alveoli as the period of apnoea increased. This correlates with the findings of Baraka et al 2006. [8]

The $EtCO_2$ in the control group was 27.4 mm of Hg as compared to the case group which was 27 mm of Hg and there was no statistically significant difference between the two groups at the onset of apnoea. However, the increase in the $EtCO_2$ at the termination of the study when positive pressure ventilation (PPV) was initiated showed a rise of 16.6 mm of Hg in the case group as compared to an 11.7 mm of Hg rise in the control group. This showed a significant difference with a 'p' value of 0.013. The average rise in the $EtCO_2$ per minute was 2.8mm of Hg. The greater rise in the $EtCo_2$ in the case group occurred due to a longer period of apnoea in this group of patients[s]. However, none of the patients in the study showed any ill effects due to a rise in the $EtCO_2$ with the six minutes of apnoea. The average rise in value of $EtCO_2$ in the case group B was 43.6 mm of Hg as compared to the control group which showed an average

maximum value of 39.2 mm of Hg. A study done by Rudolf[18] in 2013, found that insufflating low flow oxygen insufflation via the nasal route into the trachea of patients undergoing endoscopy reduced the rate of CO_2 rise by approximately 50% to 1.8mm/ min. Thus, if high flow nasal cannulation could achieve a flow of just 1L/min in the trachea this might just be sufficient to achieve significant ventilation and not just oxygenation. In 2015, Patel[19] et al and Miguel-Montanes[20] published supporting the use of high flow nasal cannula for preoxygenation and apnoeic oxygenation. Patel et al additionally found that high flow nasal cannula provided apnoeic ventilation.

Limitations of the study

The study population was limited to two academic medical centers

The sample size was fairly restricted in number

CONCLUSION

The present study concludes that

1. Nasopharyngeal oxygen insufflation following preoxygenation by the four vital capacity technique can significantly delay the onset of haemoglobin desaturation after the induction of general anesthesia and muscle relaxation.

2. The duration of desaturation free apnoea in the case group was 6 minutes.

3. The fall in the SpO_2 in the apnoeic patients is the maximum in the third minute of apnoea.

4. The rise in the $EtCO_2$ is on an average at the rate of 2.8mm of Hg per minute

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Ethical Clearance from: Institutional Ethics committee of Kasturba Medical College, Mangalore (Reg no. ECR/541/inst/KA/2014)

Source of Funding: Self

Conflict of Interest: Nil

REFERENCES

1. Russell GN, Smith CL, Snowdon SL, Bryson TH. Preoxygenation and the parturient. Anesthesia.1987; 42:346-351.
2. Damia G, Mascheroni D, Croci M, Tarenzi L. Perioperative changes in the functional residual capacity in morbidly obese patients. Br J Anesthesia 1988; 60:574-8.
3. Marks SJ, Zisfein J. Apnoeic oxygenation in apnoea tests for brain death. A controlled randomized trial. Achieves of Neurology 1990; 47:1066-8.
4. Teller LE, Alexander CM, Frumin MJ, Gross JB.Pharyngeal insufflation of oxygen prevents arterial desaturation during apnoea. Anesthesiology 1988; 69:980-2.
5. Besnier, E., Guernon, K., Bubenheim, M. et al, Pre-oxygenation with high-flow nasal cannula oxygen therapy and non-invasive ventilation for intubation in the intensive care unit. Intensive Care Med.2016; 42:1291–1292.
6. Pandit JJ, Duncan T, Robbins PA. Total oxygen uptake with two maximal breaths technique and the tidal volume breathing technique: a physiologic study of peroxygenation. Anesthesiology 2003; 99:841-6.
7. Gambee AM, Hertzka RE, Fisher DM. Preoxygenation techniques: comparison of three minutes and four breaths. Anesthesia & Analgesia 1987; 66:468-70.
8. Baraka A, Taha S, Aouad MT, El- Khatib MF, Kawkabani NI. Preoxygenation: Comparison of maximal breathing and tidal volume breathing techniques. Anesthesiology 1999; 91:612-6.
9. Holmdahl MH. Pulmonary uptake of oxygen, acid base metabolism and circulation during prolonged apnoea. Acta Chirurgica Scandinavica 1956; 212:1-128.
10. Semler, M.W., Janz, D.R., Lentz, R.J., Matthews, D.T., Norman, B.C., Assad, T.R. et al, Randomized trial of apnoeic oxygenation during endotracheal intubation of the critically ill. Am. J. Respir. Crit. Care Med. 2016; 193:273–280.
11. Valentine SJ, Marjot R, Monk CR. Preoxygenation in the elderly: a comparison of the four maximal breath and three-minute tidal volume techniques. Anesthesia & Analgesia 1990; 71:516-19.

12. Campbell IT, Beatty PC. Monitoring preoxygenation. British Journal of Anaesthesia 1994; 72:3-4.
13. Gold MI, Duarte I, Muravchick S. Arterial oxygenation in conscious patients after 5 minutes and after 30 seconds of oxygen breathing. Anesthesia & Analgesia 1981; 60:313-5.
14. Norris MC, Deewan DM. Preoxygenation for cesarean section: A comparison of two techniques. Anesthesiology 1985; 62:827-29.
15. Hamilton WK, Eastwood DW. A study of denitrogenation with some inhalation anesthetic systems. Anesthesiology 1955; 16:861-7.
16. Russell GN, Smith CL, Snowdon SL, Bryson TH. Preoxygenation techniques. Anesthesia & Analgesia 1987; 66:1341-2.
17. Taha SK, Siddik-Sayyid SM, El- Khatib MF, Dagher CM, Hakki MA, Baraka AS. Nasopharyngeal oxygen insufflation following preoxygenation using four deep breath technique. Anesthesia 2006; 61:427-30.
18. Rudolf B, Hohenhorst W. Use of apnoeic oxygenation for the performance of pan-endoscopy. Otolaryngol Head Neck Surg 2013; 149:235-9.
19. Patel A, Nouraei SA. Transnasal Humidified Rapid-Insufflation Ventilatory Exchange (THRIVE): A physiological method of increasing apnoea time in patients with difficult airways. Anesthesia 2015; 70:323-9.
20. Miguel-Montanes R et al. Use of high-flow nasal cannula oxygen therapy to prevent desaturation during tracheal intubation of intensive care patients with mild-to-moderate hypoxemia. Crit Care Med 2015; 43:574-83.

Oral Health Status of 12 Years Old Children in Rural Area of District Indore, MP: A Cross Sectional Study

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ABSTRACT

Introduction- Oral health is an integral part of the general health and well-being of an individual and is now recognized as an equally important criterion. Among the common oral diseases, dental caries and periodontal diseases are the two foremost conditions that remain widely prevalent and affect all populations throughout their life span. Poor oral health in childhood often continues into adulthood, affecting economic productivity and quality-of-life.

Methodology- Present cross sectional study was conducted among 12 years old children of rural school in the catchment area of Sri Aurobindo Institute of Medical Sciences, Indore.400 children were included in the study and oral cavity examination was done by trained personal. Data was analysed using SPSS19.0 and frequency were calculated for quatitative variables and chi square test was applied for categorical variables.

Results- The present study srevealed that out of 400 participants 140(35%) were female and 260(65%) male. Decay teeth were more in male(36.05%) than the female(34.08%) and the difference was found statistatically significant ,it was more in lower socioeconomic class as 64%of male and 59% of female of this were affected with decay teeth and developmental defects of enamel was more in male in comparison of female, it was found statistically significant.

Conclusion-The study reveals that dental caries still remains as a major oral health problem among school children of all age group. Oral health education should be organized in schools to maintain proper oral health.

Keywords- *Oral health status, 12 years old children, Rural, school, Indore*

INTRODUCTION

Dental caries can be traced to be as old as civilization with its evidence seen even in skeletal remnants of prehistoric humans[1]. Dental caries is the most prevalent dental affliction of childhood. In spite of credible advances in dentistry, the disease continues to be a major public health problem. Untreated oral diseases in children frequently lead to serious general health problems, significant pain, interference with eating, and lost school time[2]. Dental caries is highly prevalent among children and persists to be a significant public health problem. It has detrimental consequences on children's quality of life by inflicting pain, premature tooth loss,and malnutrition, eventually influencing overall growth and development. The children suffering from poor oral health are twelve times more likely to have restricted activity days as compared to their healthy counterparts[3]. It has been observed that during 1940, the prevalence of dental caries in India was 55.5%, and during 1960, it was reported to be 68%[4]. The National Oral Health Survey and Fluoride Mapping 2003 reported that the prevalence of dental caries among 12yearold children was 72.5% and among 15yearold children was 75.4% in India[5].Decreased prevalence of dental caries

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in developed countries can be attributed to changing lifestyle and behavior patterns, fewer intakes of refined sugars, and widespread use of fluoridated toothpaste and utilization of the dental care services. Contrary to this, increase dental caries in developing countries can be related to factors, such as economic development, changing living standards, rapid urbanization, and changing of dietary patterns to more refined carbohydrates[6]. India, a developing country, faces many challenges in rendering oral health needs. The majority of Indian population resides in rural areas[7]. Decayed, missing, and filled teeth (DMFT) and SiC of 1.8 and 3, respectively. The majority of children aged 12 years had experienced caries in one or more of their total number of teeth[8]. Study of this age group is important as India is a country of widespread diversity in the socioeconomic status and oral health status in rural and urban areas of same country[9].India is a rapidly growing nation in terms of population and economic growth almost 31% of the total population belongs to the 0–14 years of age group[10] Children <18 years constitute about 40% of the Indian population[11]. There is lack of organized school healthprograms in our country. The children in schools are relatively easily accessible, compared to any other population groups for any health promotion programs aimed at effecting the lifestyle changes. School health programs have proven effective in promoting health in many developed countries[12,13]. This age group forms a significant proportion of Indian population today and is likely to further increase in the years ahead. Further, 12 years is a WHO recommended index age group for oral health survey. The objective of present study to assess the oral health status of children going in government schools.

METHODOLOGY

This study was conducted among 12years old children of government rural schools in the catchment area of Sri Aurobindo Institute of Medical Sciences, District Indore. After getting the ethical approval from the institute ethical committee, list of schools was obtained from the office of District Education Officer of District Indore. The schools were stratified into primary, middle, high school and of which middle and high schools were selected. A pilot study was conducted to get the prevalence of dental caries and on this basis sample size was calculated by using $4pq/L^2$ where prevalence of caries 52.3% was used and sample size came 400. Sample was collected by including 12 yrs of student from the schools and the age of students was verified by school records. The selected students were then evaluated for oral health status by a trained examiner who took training in department of community dentistry and Pedo-odontology.

All the children were examined under adequate illumination in the school premises. WHO criterion was used for evaluation of dentition status and treatment needs. The criterion recommends examination for dental caries using mouth mirror and community periodontal index (CPI) probe. The examination was conducted with a plain mouth mirror and CPI probe as given by the WHO 1997. The examination proceeded in an orderly manner from one tooth or tooth space to the adjacent tooth or tooth space. Clinical examination included the assessment of dentofacial anomalies according to the WHO Oral Health Assessment form (1997)[10] by recording: Enamel hypoplasia Development defects of Enamel Index[10], Dental fluorosis Index Modified criteria, Dental Aesthetic Index (DAI). Oral Hygiene Index Simplified (OHIS)[11] was used to assess oral hygiene. The school authorities were requested to pass on this information to all the parents/guardians so that children could be taken to dental college for availing free treatment through the referral cards given to them at the time of study.

RESULTS

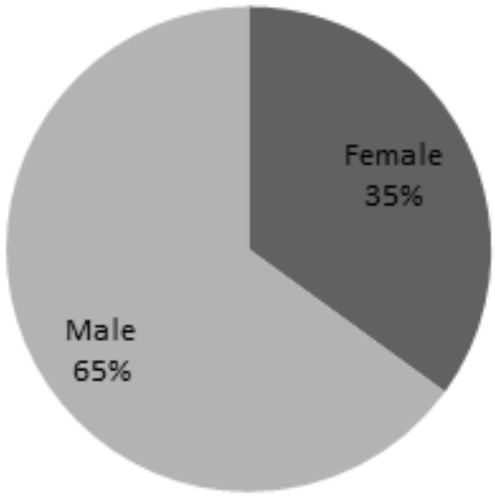

Figure -1 Distribution of participants

Above figure shows that 400 participants were included in the study out of which 140 (35%)were female and (65%) male.

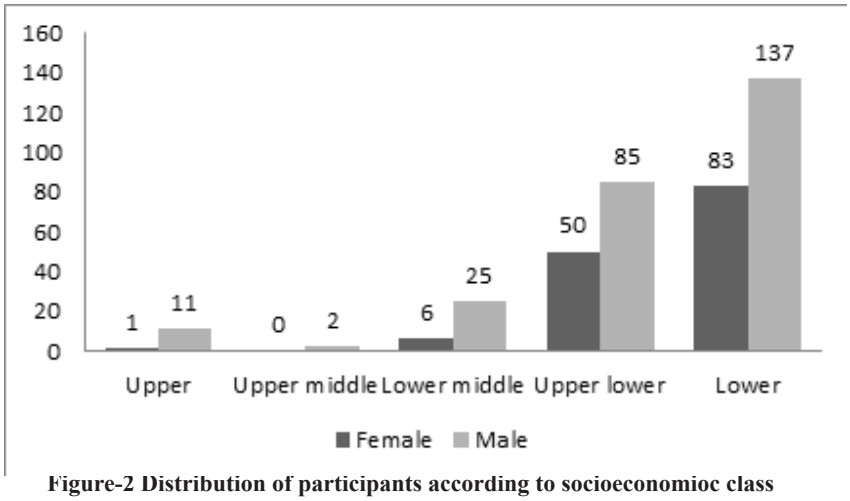

Figure-2 Distribution of participants according to socioeconomioc class

Above figure shows that 113 (28.25%) belonged to upper lower of socioeconomic class and 220 (55%) of them from the lower socioeconomic class.

Table 1- Association of DMFT with gender

S. No.	Variables	Gender		Total	Chi-square value	P value
	Decay Teeth	**Girls**	**Boys**			
1.	Present	40(34.08%)	112(36.05%)	152(38%)	4.3	**<0.05**
	Absent	100(65.92%)	158(63.95%)	258(62%)		
2.	**Missing Teeth**					
	Present	3(2.23%)	4(1.5%)	7(1.67%)	0.19	**>0.05**
	Absent	137(97.77%)	256(98.5%)	393(98.33%)		
3.	**Filled teeth**					
	Present	8(5.71%)	27(10.38%)	35(8.75%)	2.4	**>0.05**
	Absent	132(94.29%)	233(89.62%)	365(91.25%)		
4.	**Traumatic Teeth**					
	Present	3(2.15%)	20(7.08%)	23(5%)	3.7	**=0.05**
	Absent	137(97.85%)	240(92.02%)	380(95%)		

Above table depicts that out of 400 participants 152 (37.5%) had decay teeth and of which 40(34.08%) were female and 112 (36.5%) boys. decay teeth was more in male than female and the difference was found statistically significant. Above table describes that 35(8.75%) of participants had filled teeth and filled teeth was found more in males than females but the difference was not statistically significant. Table shows that 19(4.75%) of participants had decay teeth and decay teeth was found more in boys than girls but the difference was not statistically significant and also describes that only 7 (1.67%) of participants had filled teeth and filled teeth was found more in males than females but the difference was not statistically significant. Above table depicts that 20(5%) of participants had trauma teeth and teeth was found more in males than females but the difference was statistically significant.

Table 2- Distribution of 12-year-old students by CPI score and gender

CPI Score	Gender		Total
	Girls	Boys	
Healthy	132(47.15%)	148(52.85%)	**280(70%)**
Bleeding	3(75%)	1(25%)	**4(1%)**
Calculus	34(29.31%)	82(70.68%)	**116(29%)**
Total	**169(42.25)**	**231(57.75%)**	**400(100%)**

Above table shows that majority of children (70%) had healthy gums only 1% of participants had bleeding gums and 29% had calculus.

Table 3-Association of developmental defects of enamel with sex

Sex	Developmental defect of enamel				
	Healthy	Hypoplasia	Diffuse opacity	Demarcated Opacity	Total
Female	107 (84.9%)	17(7.64%)	16(4.14%)	1(.32%)	**140(100%)**
Male	221(84.98%)	26(10.09%)	9(3.65%)	3(1.29%)	**260(100%)**
Total	328(82.25%)	36(9.00%)	15(3.75%)	4(1%)	400(100%)

Chi square value=10.5, pvalue <.05

Above table describes that boys has more developmental enamel defects and hypoplastic enamel was found 10.09% among the boys than the girls 7.64% and prevalence of diffuse opacity was slightly more in girls (4.14%) than the boys (3.65%), demarcated opacity was found more among boys (1.29%)than the girls (0.32%) and this difference was found statistically significant.

Table 4-Association of oral mucosal condition with sex

Sex	Oral mucosal condition			
	Normal	Ulcerated	Abscess	Total
Female	136(97.45%)	3(1.91%)	2(.62%)	**140(100%)**
Male	253(97.42%)	7(2.58%)	1(0%)	**260(100%)**
Total	**389(97.25%)**	**10(2.5%)**	**1(.25%)**	**400(100%)**

Chi square value=1.4, pvalue >.05

DISCUSSION

Present study was conducted in Government middle schools of District Indore the catchment area of Sri Aurobindo Institute of Medical Science, Indore. 400 participants were included in the study out of which 140 were females and 260 males. Similar findings were found in a study conducted by Sarve et-al. Majority of participants were from lower socioeconomic class. Study carried out by George and Mullamottil[12]and also found that majority of the children were from lower socio-economic class. Prevalence of decay teeth was found 38% among the participants. Study conducted by Thakur et al[15] found that the prevalence of decay teeth was 35.2% in rural schools. Decay of teeth were more in boys compared with girls and the difference was found statistically significant. Prevalence of Missing teeth was 1.67% and filled teeth was 4.75% similar finding was found in a study by Zafer Azizi[16]. Majority of children had healthy gums (70%) and similar findings were observed in study conducted by George and Mullamottil

in Kerala. In present study 24% of girls in the age group of 12 years suffered from gingival problems which was less (50.8%) compared to a study conducted in Chennai[7]. 27% percent of boys in the same age group suffered from gingival problems which was lower (51.7%) compared to school children in Chennai.

This study observed that 82.25% 0f children had normal, 9% hypoplastic, 3.75% diffuse opacity and 1% had demarcated opacity in enamel. Hypoplastic enamel was dominant type of developmental enamel defects. Enamel defects wewre dominant in girls than boys and this difference was found statistically significant.Similar finding has observed in a study conducted by Fabiana vargas and Ferreira[17].

Conflict of Interest- None

Source of Funding- No

Ethical approval- Ethical committee of SAIMS, Indore

REFERENCES

1. National oral health organization. National oral health policy: JIDA 1986;58:397-401.
2. Biesbrock AR, Walters PA, Bartizek RD. Initial impact of a national dental education program on the oral health and dental knowledge of children. J Contemp Dent Pract 2003;4:1-10.
3. Dawani N, Nisar N, Khan N, Syed S, Tanweer N. Prevalence and factors related to dental caries among pre-school children of Saddar Town, Karachi, Pakistan: A cross-sectional study. BMC Oral Health 2012;12:59.
4. Ramachandran CR. Oral health. ICMR Bulettin 1994;24:51-5.
5. Vol. 32. New Delhi: Dental Council of India; 2004. National Oral Health Survey and Fluoride Mapping. An Epidemiological Study of Oral Health Problems and Estimation of Fluoride Levels in Drinking Water; pp. 67–78
6. B, Petersen PE, Ouattara S. Oral health behaviour of children and adults in urban and rural areas of Burkina Faso, Africa. Int Dent J 2006;56:61-70.
7. Mahesh Kumar P, Joseph T, Varma RB, Jayanthi M. Oral health status of 5 years and 12 years school going children in Chennai city – An epidemiological study. J Indian Soc Pedod Prev Dent 2005;23:17-22.
8. Bali RK, Mathur VB, Talwar PP, Chanana HB. National Oral Health Survey & Fluoride Mapping 2002-2003. Dental Council of India. New Delhi, India. Available from: http://www.docstoc.com/docs/83028952/summary.
9. Nithila A, Bourgeois D, Barmes DE, Murtomaa H. WHO Global OralData Bank, 1986-96: An overview of oral health surveys at 12 years of age. Bull World Health Organ 1998;76:237-44.
10. Available from: http://www.censusindia.gov.in/Data_Products/Library/ Indian_perceptive_link/Census_Terms_link/censusterms.html.
11. Gross Enrolment Ratios in Primary and Upper Primary Schools. Selected Educational Statistics, Ministry of Human Resource Development, Government of India. Infochange education. News and analysis on social justice and developmental issues in India. Available from: http://www.infochangeindia.org/education/statistics/gross-enrolmentratios- in-primary-and-upper-primary-schools.html.
12. Wells J, Barlow J, Stewart-Brown S. A systematic review of universal approaches to mental health promotion in schools. Health Educ J 2003;103:197-220.
13. Swart D, Reddy P. Establishing networks for health promoting schools in South Africa. J Sch Health 1999;69:47-50.
14. Benley George, Vinod Mathew, Oral health status of 5, 12, and 15-year-old school children in Tiruvalla, Kerala, Journal of Dentistry and medicalresearch India,2015,Vol:3,Issue 1:15-19
15. Thakur Singh Arun,Acharya Shashidar,Singhal Deepak, Oral health status and oral health behaviors of 12-year-old urban and rural school children in Udupi, Karnataka, India: A cross-sectional study; Journal of dental and allied sciences,2017, vol 6,Issue 1,12-14
16. Azizi Zafer;The Prevalence of Dental Caries in Primary Dentition in 4- to 5-Year-Old Preschool Children in Northern Palestine, International Journal of DentistryVolume 2014, Article ID 839419, 5 page
17. Fabiana vargas and Ferreira; Developmental enamel defects and their impact on child oral health-related quality of life, Braz Oral Res. 2011 Nov-Dec;25(6):531-7

Effect of Neuro Muscular Electrical Stimulation in Swallowing Muscle Function on Post Stroke Dysphagia

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ABSTRACT

Aim And Objectives: To determine the effects of Neuro Muscular Electrical Stimulation in improving Muscles Function of Swallowing among subjects with post stroke dysphagia. **Methodology:** Quasi experimental study design was used this study. Total 30 Post stroke dysphagic patients were selected and all 30 patients underwent sEMG study for massator, sub mental and infra hyoid muscles. Neuromuscular electrical stimulation over the Pharyngeal muscles given for 4 weeks. End of the fourth week post test measurement was taken values were tabulated and statistically analyzed. **Results:** surface electro myography of bilateral massator, submental and infrahyoid muscle function in amplitude is improved in between pre and post intervention, test values that is P value is 0.001.**Conclusion:**Neuro muscular electrical stimulation is more beneficial effect in swallowing muscle activity in measures of amplitude on post stroke dysphagia.

Keywords: *Post stroke dysphagia, sEMG, NeuroMuscular electrical stimulation*

INTRODUCTION

Dysphagia is defined as an impairment of the complex and integrated sensorimotor system. Neurogenic dysphagia (ND) typically occurs in patients with neurological diseases of varying etiologies, and it is associated with high mortality, morbidity, and social costs because of the increased risk of aspiration pneumonia and its sequelae.[1-6] Immediately, after stroke oropharyngeal dysphagia is seen in 50% of stroke patients. Of these, up to 40% remain dysphagic a year later[7]. Complications of dysphagia includes aspiration, pneumonia, and malnutrition[8] for which patients require enteral sustaining through a nasogastric tube or percutaneous endoscopically presented gastrostomy tube, which frequently requires long term institutional care[9]. Post Stroke Dysphagia is thought to be due to damage to the cortex and sub cortical structures [10]. In spite of the fact that dysphagia might be dealt with utilizing a few physical procedures, there is no conclusive medications[11].Dysphagia usually follows stroke that affects the predominant swallowing muscles that is bilateral massator, submental and infrahyoid. In the last 20 years, physiotherapy techniques in which neuromuscular electrical stimulation (NMES) is the usually used technique for swallowing function but very minimal literature is found regarding the electromyography activity of swallowing muscles after NMES. In this study, we concentrate on the electromyography activities of swallowing muscles.

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METHODOLOGY

Participants: the sample will be drawn from Physiotherapy department OPD and IP at Saveetha Medical hospital. The subjects will sign an informed consent form after a elaborate education about the study purpose, duration and other aspects by the researcher. The subjects who fulfill the criteria's of inclusion will be selected for the study. Inclusion criteria**:** Age group: 50 – 55 years, both genders. Post stroke subjects with difficulty in swallowing. Subjects confirmed swallowing difficulty with positive water swallow test. Exclusion criteria**:** Recent trauma, unstable vital signs, recent surgeries around the neck. Subjects with any other

neurological disorders, Symptomatic cardiovascular diseases, Skin allergies.

Ethical consideration: The study was approved by the Institutional Ethics Committee (Number 015/02/2017/IEC/SU on 28/02/2017) and done in accordance with the Ethical Guidelines for on Human Participants, The study protocol was approved by institutional ethical committee.

Procedure: The patient willing to participate in this studywere explained about the safety and simplicity of the procedure and informed consent and information sheet were obtained. 30 subjects were selected according to the inclusion and exclusion criteria. All the 30 subjects underwent surface electromyography as a pre test measurement.The Patient position was sitting and three muscle groups were investigated and muscle activity recorded. Three muscle locations were examined in the study: (1) masseter (2) submental (3) Infrahyoid. All EMG recording were made using surface electrode which was made up of silver chromium. Allengers Scorpio EMG EP NCS, computer based EMG system with software. The Electrodes have wide band pass filter band with (RMS) - of 30 to 500 Hz and a 60 Hz Notch filter. It consists of two bipolar electrode and ground electrode. Specific electrode positions were as follows the interelectrode distance was 10 mm in all locations except sub mental. For massator muscle two bipolar electrodes were placed parallel to the massator muscle fibers on the left side of the face. Sub mental muscle two surface electrodes were attached to the skin beneath the chin on the right side of midline to record submental myoelectrical activity over the platysma. And two electrodes were placed on the left side of the thyroid cartilage to record from the infrahyoid muscle group. Electrical impedance at sites of electrode contact was reduced because target areas were lightly scrubbed with alcohol gauze pads, followed by application of an electrode gel. All the 30 subjectsreceived Electrical stimulation with the frequency of 30 Hz, duration of 100ms, intensity was increased till minimal palpable observable contraction and interrupted direct current was used.The patient position was supine lying and pillow kept under the head. And inactive electrode was placed nape of the neck, active pen electrode was placed pharyngeal muscles either side of the hyoid bone for 5 days/week for 4 weeks. The post test measurement was taken similar to pre test measurement. The surface electromyography measures in amplitude. All the data were tabulated and statistically analyzed.

RESULT

In surface electro myography left massator Muscle Amplitude Pre testMean-16.952mv, standard deviation-1.435, Post test mean-64.215mv, standard deviation-3.859,t value-86.580, P value <0.001, extremely statisticallysignificant. left Submental Muscle Amplitude Pre testMean-24.5013mv,standard deviation-3.0071,Post test mean-121.9050mv,standard deviation-6.0513,t value-116.1416,P value <0.001,extremely statistically significantleft Infrahyoid Muscle Amplitude Pre testMean-22.0040mv, standard deviation-1.8564,Post test mean-74.1043mv,standard deviation-17.5628 ,t value-15.9395,P value <0.001, extremely statistically significant. (table-1)

Right massator muscle amplitude pre test mean16.9970mv, standard deviation-1.360 and post test mean-64.229mv, standard deviation-3.811.t value-86.9896, P value is <0.001, extremely statistically significant. Right Submental muscle amplitude pre test mean 24.3210mv, standard deviation-3.0902 and post test mean-121.9257mv, standard deviation-6.0063,t value-115.7434, P value is <0.001 extremely statistically significant. Right Infrahyoid muscle amplitude pre test mean 21.9440mv, standard deviation-1.7722 and post test mean-74.4547mv, standard deviation-18.0887.t value-15.5360, P value is <0.001 extremely statistically significant.(table-2)

Table-1- Left Massator,submental,Infrahyoid sEMG Pre and Post test values

Name of the Muscle		Mean	Standard deviation	t value	p value
Left massator	Pre	16.952	1.435	86.580	<0.001
	Post	64.215	3.859		
Left Submental	Pre	24.501	3.0071	116.1416	<0.001
	Post	121.9050	6.0513		
Left Infra hyoid	Pre	22.004	1.8564	15.9395	<0.001
	Post	74.1043	17.5628		

Table-2- Right Massator,submental,Infrahyoid sEMG Pre and Post test values

Name of the Muscle		Mean	Standard deviation	t value	p value
Right massator	Pre	16.9970	1.360	86.9896	<0.001
	Post	64.229	3.811		
Right Submental	Pre	24.321	3.0902	115.7434	<0.001
	Post	121.925	6.0063		
Right Infra hyoid	Pre	21.944	1.7722	15.5360	<0.001
	Post	74.454	18.0887		

DISCUSSION

The purpose of the study is to determine the effect Neuro Muscular Electrical Stimulation in facilitating the swallowing muscle activity. Several earlier studies have been directed to show the viability of NMES treatment strategies for dysphagia.[12] It was predicted that repeated neuromuscular electrical stimulation will improve the muscle function in swallowing.This was based on the previous study pharyngeal electrical stimulation for neurogenic dysphagia[13]. EMG data is collected and supported this hypothesis. The result shows significant increase in the pharyngeal muscle activity.

The previous study conducted in Japan on the effectof pharyngeal electrical stimulation on swallowing performance by Ryosuke Takeishi and Jin Magara as an effective function in swallowing muscle activity on post stroke dysphagia. The Limitations in this study were that the study was conducted in only one hospital, the results were derived from a small sample of stroke patients and only one technique to facilitate swallowing was done. The data collection took longer than expected. Larger numbers are needed in future investigations, as are variations in treatment regimens. In a future study, different electrical stimulation can be given with variations in duration, and intensity.

CONCLUSION

This study showed that Neuro Muscular Electrical stimulation is effective in improving swallowing Muscle function in Electromyographic activity on patients with Post stroke dysphagia.

Conflict of Interest: Nil

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REFERENCES

1. Abraham S, Scheinberg A, Smith CR, La Rocca NG. Neurologic impairment and ability status in outpatients with multipla sclerosis reporting dysphagia symptomatology. J Neurol Rehab. 1997;11:7–13.
2. Bergamaschi R, Crivelli P, Rezzani C, et al. The DYMUS questionnaire for the assessment of dysphagia in multiple sclerosis. J Neurol Sci. 2008;5;269(1–2):49–53.
3. Restivo DA, Marchese-Ragona R, Patti F, et al. Botulinum toxinimproves dysphagia associated with multiple sclerosis. Eur J Neurol. 2011;18(3):486–490.
4. Restivo DA, Palmeri A, Marchese-Ragona R. Botulinum toxin for cricopharyngeal dysfunction in Parkinson's disease. N Engl J Med. 2002;346:1174–1175.
5. Alfonsi E, Versino M, Merlo IM, et al. Electrophysiological pattern of oro-pharyngeal swallowing in parkinsonian syndromes. Neurology. 2007;68(8):583–589.
6. Restivo DA, Marchese-Ragona R, Staffieri A, De Grandis D. Successful botulinum toxin treatment of dysphagia in oculopharyngeal dystrophy. Gastroenterology. 2000;119:1416.
7. Smithard DG, Smeeton NC, Wolfe CD. Long-term outcome after stroke:does dysphagia matter? Age Ageing. 2007;36:90–94.
8. Martino R, Foley N, Bhogal S, Diamant N,

Speechley M, Teasell R. Dysphagia after stroke: incidence, diagnosis, and pulmonary complications. Stroke. 2005;36:2756–2763.

9. Falsetti P, Acciai C, Palilla R, Bosi M, Carpinteri F, ZingarelliA,et al. Oropharyngeal dysphagia after stroke: incidence, diagnosis, and clinical predictors in patients admitted to a neurorehabilitation unit. J Stroke Cerebrovasc Dis. 2009;18:329–335.
10. Hamdy S, Aziz Q, Rothwell JC, Singh KD, Barlow J, Hughes DG, et al. The cortical topography of human swallowing musculature in health and disease. Nat Med. 1996;2:1217–1224.
11. Geeganage C, Beavan J, Ellender S, Bath PM. Interventions for dysphagia and nutritional support in acute and subacute stroke. Cochrane Database Syst Rev. 2012; 10:CD000323.
12. Kyoung Don Kim, Hyun Jin Lee, Myoung Hyo Lee, Hyo Jeong Ryu, Effects of neck exercises on swallowing function of patients with stroke J Phys Ther Sci. 2015 Apr; 27(4): 1005–1008.
13. Restivo DA, Hamdy S. Pharyngeal electrical stimulation device for the treatment of neurogenic dysphagia: technology update. Med Devices (Auckl). 2018 Jan 4;11:21-26

Estimation of Random Blood Glucose from Gingival Crevicular Blood- A Cross Sectional, Diagnostic Study

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ABSTRACT

AIM: To prove that gingival crevicular blood can be used as a novel, minimally- invasive, diagnostic tool to screen undiagnosed diabetic population with gingivitis and periodontitis as compared to invasive phlebotomy and finger puncture blood collection procedures.

OBJECTIVES: To estimate random blood glucose levels from gingival crevicular blood through glucometer. To compare the random blood glucose levels from venous blood by laboratory glucometric methods. To prove that gingival crevicular blood is a minimally invasive diagnostic tool as compared to phlebotomy and finger puncture procedures with good patient compliance.

METHODOLOGY & RESULT: 75 Out-patients with gingivitis and periodontitis who are unaware of their diabetic status undergoing routine intraoral clinical examination will be subjected to periodontal probing after isolating the area to be examined. Blood oozing through the gingival crevice from the anterior maxillary region will be collected by a glucometer for random blood glucose. Samples obtained by phlebotomy technique will be analyzed for random blood glucose through calorimetric methods in the laboratory. Results obtained from both the gingival crevicular blood and venous blood will be compared and statistically analysed. 25 Out-patients who have already been diagnosed as diabetic are included as controls in the study. Correlation between Gingival crevicular blood glucose (GCBG) and Venous blood Glucose (VBG) in total samples were statistically analyzed using SPSS version 11. Highly significant correlation between GCBG & VBG ($r=0.993$) in total was found. Correlation is highly significant at $p<0.01$.

CONCLUSION: Random blood glucose levels measured in GCBG is almost equal to that of VBG. Hence we conclude saying that GCB can be used as a minimally invasive and easy to collect tool for screening diabetes in our routine dental practice as early diagnosis of diabetes helps to prevent its long-term complications, high morbidity and mortality.

Keywords : Diabetes mellitus, Gingival Crevicular Blood, Minimally invasive, Random Blood Glucose.

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INTRODUCTION

Diabetes mellitus (DM) is a chronic metabolic disorder with an estimated prevalence of 7% in industrialized countries of which nearly half the cases are undiagnosed.[1] India has nearly 33 million diabetic

subjects today with an overall prevalence rate of 4.3%.[2] Type 2 DM .i.e. NIDDM constitutes nearly 70% of population in any country, with a prevalence of 2.4% in rural population and 11.6% in urban population.[3] The chronic hyperglycemia of diabetes is associated with a wide range of complications like diabetic retinopathy, atherosclerotic cerebrovascular, cardiovascular and peripheral vascular diseases, peripheral neuropathy, progressive renal dysfunction, delayed wound healing and periodontitis.[4]Recent evidence indicates that diabetic complications such as retinopathy, cardiovascular disease and neuropathy may begin several years before the diagnosis of type 2 diabetes mellitus is established. The early diagnosis of diabetes, therefore, might help to prevent its long-term complications that are responsible for the high morbidity and mortality of these patients.[5] Early diabetes detection could identify diabetes-related complications at an earlier stage, suggesting the value of screening to discover unrecognized illness, manage existing complications, and prevent the progression of disease.[6] Periodontal disease is considered to be the sixth complication of diabetes.The interrelationship between diabetes mellitus and periodontitis has been studied for many years. Diabetes and Periodontitis seem to interact in a bidirectional manner[5].

For over 100 years, various methods have been used to measure glucose level in biological fluids, but the search for more specific, sensitive and simple method continues. Since centuries, the clinicians are sending venous blood, or urine samples for determining glucose levels to clinical biochemistry laboratories. But these days portable glucose monitors are in use both as a bed side testing of glucose[5]. Portable glucose monitors can be used for the estimation of blood glucose in dental set up also. Periodontal disease itself is associated with gingival bleeding and if the patient is diabetic, it is more severe. Bleeding from the gingival tissues is found to be further pronounced if the diabetic patient's condition is poorly controlled or is in association with undiagnosed diabetes[6]. Thus ample extravasated blood is produced during routine diagnostic procedures.Probing during a periodontal examination is more familiar to the practitioner and less traumatic than a finger-puncture with a sharp lancet. This blood oozing during routine periodontal examination can be the source for the estimation of blood glucose is more severe.Glucometers are commonly used by diabetic patients for home monitoring of blood glucose levels. Recently, more sensitive self-monitoring devices have been developed for testing small amounts (<2microlitre) of blood obtained from areas much less sensitive than fingertips, such as the forearm, upper arm, thigh, or base of thumb. In general, accuracy of these novel glucometers has been acceptable.[7] The conventional laboratory methods that are employed to screen for diabetes are time consuming and elaborative equipment are needed to employ these techniques. The advent of blood glucose monitors allows the clinician to assess blood glucose at the chair side. In contrast to laboratory methods, results are obtained instantaneously, which helps the clinician to decide if further confirmatory test are required to diagnose diabetes.[8] Inflammatory markers are seen raised markedly in undiagnosed diabetic populatioin which signify the severity and progression of the disease. Three most common markers are C-Reactive Protein, TNF-alpha and IL-6. Studies show that elevated CRP levels are a strong independent predictor of type 2 diabetes and may mediate associations of TNF-alphaR2 and IL-6 with type 2 diabetes[9].

MATERIALS AND METHODS:

75 patients who were not aware of their diabetic status and 25 patients who were Type II Diabetic and were under medication who reported as outpatient to the Department of Oral Medicine and Radiology, Sree Balaji Dental College and Hospital, Chennai were included in the study.Inclusion criteria were the same mentioned above. Exclusion criteria were patients with known bleeding and clotting disorders like hemophilia, thrombocytopenic purpura, etc.

All the patient's detailed case history were recorded followed by routine intraoral examination where the patient's periodontal status was recorded examined intraorallyandthe area to be examined was isolated with cotton rolls to prevent contamination with saliva. A detailed periodontal status was recorded with graduated periodontal probe (Williams) and classified according to the American Academy of Periodontology. The degree was moderate if periodontal depth was 3- 5mm and severe if periodontal depth was greater than 6mm. Bleeding on probing was elicited 1-2minutes after probing. An appropriate site with profuse bleeding was chosen for collecting the gingival crevicular blood (GCB) (Fig.1).

Probing was repeated until sufficient bleeding was

there in the sulcus. A plastic capillary tube of

2mm bore marked was used to collection of bloodfrom the gingival sulcus after probing force of

approximately 0.2N was used to elicit bleeding from thesite. (Fig 2).

The Accu-chek Active Glucometer (RocheDiagnostics, Germany) monitoring device was loaded

with the active test strip (impregnated per cm^2 withglucose dye oxidoreductase 0.7µ) 2µl of blood wastransferred on to the test strip. The testing time is about 10seconds. Then venous blood was collected by routine phlebotomy techniquefor measurement of Random Blood Glucose levels. All the 100 samples were analyzed and readingswere recorded and tabulated.

STATISTICAL ANALYSIS

Statistical analysis was performed by SPSS 20.0. Statistical test used was Pearson Correlation Coefficient.

RESULTS

100 patients comprising 54 males and 46 females took part in the study with a mean age of 49.99 years(Fig 1& Table 1). No significant difference between RBS(GCB) and RBS(VB) when compared to age and sex group were found (Fig 2 & Table 2). The mean RBS(GCB) and RBS(VB) derived from all samples were 199.25 mg/dl and 197.83 mg/dl respectively with a Standard Deviation of 50.2 in both groups. (Fig 3 & Table 3). Correlation between RBS (GCB) and RBS(VB) of the 100 samples were analyzed withPearson correlation coefficient using the SPSS version 20.0 and scatter plot was done. Highly significant correlationbetween RBS (GCB) and RBS(VB) (r=0.993) in total samples wasfound. The correlation was significant at $p<0.01$(Fig 4 & Table 4).

Table 1: Sex Distribution

		Frequency	Percent
Valid	Male	54	54.0
	Female	46	46.0
	Total	100	100.0

Table 2: Age distribution

Frequency		Percent
21-30	4	4.0
31-40	23	23.0
41-50	27	27.0
51-60	25	25.0
61-70	16	16.0
71-80	5	5.0
Total	100	100.0

Table 3. Descriptive analysis of RBS from GCB & VB

	Minimum	Maximum	Mean	Std. Deviation
Age in years	29	80	49.99	12.201
RBS (GCB)	136	400	199.25	50.216
RBS (VB)	130	390	197.83	50.235

Table 4 : Pearson Correlation Coefficient

		RBS (GCB)	RBS (VB)
RBS (GCB)	Pearson Correlation	1	.993(**)
RBS (VB)	Pearson Correlation	.993(**)	1

DISCUSSION

Testing for Type 2 Diabetes Mellitus at should becarried out in individuals who are obese, have a 1st-degree relative with diabetes,are members of a high-risk ethnic population, have delivered a babyweighing 4.05 kg or have been diagnosedwith gestational diabetes mellitus are hypertensive (>140/90), have an HDLcholesterol level <35 mg/ dl and/or atriglyceride level >250 mg/ dl, had onprevious testing an impaired glucosetolerance or an impaired fasting glucose[4]. Undiagnosed diabetic patients are at significantly increased risk for development of complications and the bidirectional relationship of diabetes with periodontitis underscores the necessity for early detection of diabetes[17].

Testing crevicular blood glucose level with the Accu-Chekself monitoring device is sensitive, since it can provide results with just 2- 3ul of blood within 10 seconds. With regard to the development of painless and non-invasive methods to measure blood glucose, considerable effort has been made in the past few years. Since periodontal inflammation with or without the complication factor of diabetes mellitus is known to produce ample extravasate of blood during diagnostic periodontal examination[1]. As we compared our study with the similar studies 1, 5, 6, 7, 8, 10, 14, the results obtained were much consistent with highly significant correlations ($r= 0.993$, $p<0.01$) were found between RBS(GCB) & RBS (VB).

The strong correlation ($r=0.993$, $p<0.01$) between the random blood glucose levels from the gingival crevicular blood(GCB) and venous blood(VB) that was obtained from ourstudy clearly shows that easy availability of GCB as an alternative to the VB as GCB can be collected by a minimally invasive painless method as compared to the later. In contrast to a study[7] in which the results did not show any evidence for the usefulness of GCB for testing random blood sugar during routine periodontal examination, our study showed accurate results as the blood was collected from the gingival cervical after thorough cleaning and probing thus avoiding the chance of contamination to get accurate results.

From the above discussion, we can say that gingival crevicular blood from probing may be an excellent source of blood for glucometric analysis using the technology of portable glucose monitors. Subjects can reliably be screened for diabetes by measuring glucose levels in gingival crevicular blood, since probing and sample collection takes a very little time and there is no discomfort to the patient. Thus, a dental clinician can use this crevicular blood to test for glucose levels instead of puncturing the patient's finger tip to obtain a blood sample and can make a referral to a physician for further evaluation for diabetes when warranted[5].

The incidence rate of DM in India is increasing at an alarming rate. Hence if the dentist participate in the challenge of undiagnosed diabetes by the routine screening of patient especially those with pronounced gingival inflammation, it would be a major role and life saving service[18].

CONCLUSION

From our study we found that random blood glucose levels measured in GCB is almost equal to that of VB. Hence, GCB can be used as a minimally invasive and easy to collect tool for screening diabetes in our routine dental practice as early diagnosis of diabetes helps to prevent its long-term complications, high morbidity and mortality. However as the incidence of Diabetes Mellitus is increasing in our nation, the study can be carried out in a larger sample size.

Funding: Self-funding.

Ethical Clearance: Obtained from the Institutional Ethical Commitee

REFERENCES

1. Beikler T, Kuezek A, Petersilka G, Flemming TF. In-dental-office screening for diabetes mellitus using gingival crevicular blood. J ClinPeriodontol 2002;29:216-18.
2. Ramachandran A. Epidemiology of Diabetes in India- Three decades of Research. J Assoc Physicians of India 2005; 53:34-38.

3. Ramachandran A. Epidemiology of Type2 Diabetes in Indians. J Indian Med Assoc 2002; 100(3); 425-27.
4. Expert Committee on the Diagnosis and Classification of Diabetis Mellitus (Report) 1997 Diabetes Care 20; 1183-97.
5. HarjitKaur, Sanjeev Jain, ShwetaBansal. Minimal Invasive Chair Side Procedure For The Estimation Of Glucose Level Using Gingival Crevicular Blood. Indian Journal Of Dental Sciences. 2012;4(1): 43-46.
6. Shiela M. Strauss, Janet Tuthill, Geetika Singh, DavidRindskopf, Jack A. Maggiore et al. A Novel Intraoral Diabetes Screening Approach in Periodontal Patients: Results of a Pilot Study. J Periodontol 2012; 83:699-706.
7. H.P. Müller E. Behbehani. Screening of Elevated Glucose Levels in Gingival Crevice Blood Using a Novel, Sensitive Self-Monitoring Device. Med PrincPract 2004; 13:361–365.
8. A JawadHussain, M Sunil, Delon Chai Liu. Assessment of blood glucose using gingival capillary blood- A chairside method. SRM University Journal of Dental Sciences. 2010; 1(1): 36-40.
9. Hu FB, Meigs JB, Li TY, Rifai N, Manson JE Inflammatory markers and risk of developing type 2 diabetes in women. Diabetes. 2004; 53(3):693-700
10. Strauss SM, Russell S, Wheeler A, Norman R, Borrell LN, Rindskopf D. The dental office visit as a potential opportunity for diabetes screening: an analysis using NHANES 2003-2004 data. J Public Health Dent. 2010; 70(2):156-62.
11. Esmeili T, Ellison J, Walsh MM. Dentists' attitudes and practices related to diabetes in the dental setting. J Public Health Dent. 2010; 70(2):108-14.
12. E. Lalla,C. Kunzel, S. Burkett, B. Cheng, I.B. Lamster. Identification of Unrecognized Diabetes and Pre-diabetes in a Dental Setting. J Am Dent Assoc. 2011; 142(1):28-37.
13. Ciantar M, Spratt D.A, Newman H.N, Wilson M.Development of an *in vitro*microassay for glucose quantification in submicrolitre volumes of biological fluid. Journal of Periodontal Research. 2002; 37(2): 79-85.
14. SrikumarPrabhu, HemaSeshan, Amrita Deshpande. Reliability of using gingival crevicular blood in the diagnosis of diabetes. JIADS.2010;1(3):16-18.
15. MT Rosedale, SM Strauss. Diabetes screening at the periodontal visit: patient and provider experiences with two screening approachesInt J Dent Hygiene.2011; 1: 1-8.
16. Ervasti T, Knuuttila M, Pohjamo L, Haukipuro K: Relation between control of diabetes and gingival bleeding. J Periodontol 1985; 56:154–157.
17. Rees TD. Periodontal Management of the patient with diabetes mellitus. Periodontology 2000;23:63-72.
18. Mohan V, Deepa R, Deepa M, Somannavar S, Datta M. A simplified Indian Diabetes Score for screening for undiagnosed diabetic subjects. J Asso Physicians India. 2005; 53:759-63.

Comparison of Salivary Nitric Oxide Levelsamong Smokers and Non-Smokers in Chronic Periodontitis- A Biochemical Study

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ABSTRACT

Background and Objective: Nitric oxide (NO) is a gaseous, colorless, highly reactive, shortlived free radical plays a pivotal role in the regulation of various physiological and pathological mechanisms in the body. The pathogenesis of periodontal diseases may be affected by alterations of the inflammatory response by smoke. The aim of this study was to assess the levels of salivary NO among both the smokers and nonsmokers having chronic periodontitis and also to compare them with periodontally healthy controls.

Method: Sixty subjects who were in the age group of 30-55 years, who participated in this study participated and were divided into three groups: group I, which includes 20 healthy nonsmoking subjects; group II, 20 subjects who are Non-smokers with Chronic periodontitis ; Group III 20 subjects who are smokers with Chronic periodontitis. The biochemical estimation of NO in the collected saliva was performed using the Griess colorimetric reaction.

Statistical Analysis and Results: The statistical comparisons were done under the Griess Reaction. There were statistically significant salivary levels of NO in the groups of periodontitis (group II and III) as compared to those in the healthy controls (group I). The salivary nitric oxide levels are statistically significant among smokers than non-smokers in chronic periodontitis patients.

Conclusion: NO play an important complex role in the immuno-inflammatory process and in the remodeling and maintenance of osseous structures. As smoking increases the risk of periodontitis, the present study aimed to evaluate the effect of smoking among periodontitis patients, that is, the NO levels in these patients.

Keywords: *Chronic periodontitis, Nitric oxide, Smoking.*

INTRODUCTION

Nitric oxide (NO) is an ubiquitous intercellular messenger molecule with important cardiovascular,neurological and immune functions. Nitric oxide, a free radical gas, is a noxious chemical in the atmosphere, but in small controlled concentrations in the body, it acts as a physiological and pathophysiological mediator and it plays an important role in the biological systems [1]. It is formed in almost all cell types and despite the fact that it has a short half-life of approximately 4 seconds in vivo, it penetrates the surrounding tissues and activates a variety of cellular signaling pathways. NO is synthesized by the oxidative process of the guanidine of

the amino acid Larginine by a family of enzymes named NO synthases (NOS) [2].

In mammalian cells, NO is produced by a group of isoenzymes which are collectively termed as the NO synthases (NOS).The endothelial NOS and neural NOS are constitutive and they release small amounts of NO for a short period following the stimulation of their receptors. In contrast, iNOS is expressed in response to proinflammatory stimuli and it produces large amounts of NO for sustained time periods [3].

Saliva may contain biomarkers which are specific for the unique physiological aspects of periodontitis, and the qualitative changes which occur in the composition of these biomarkers could have diagnostic and therapeutic significance [4].

Periodontitis, a chronic inflammatory disease of the periodontal tissues, is a multifactorial disease of bacterial origin [5,6]. The products of the bacteria and proinflammatory cytokines produced by inflammatory cells trigger the expression of iNOS, which is involved in inflammatory processes and accelerates periodontal disease [7].

Risk factors for periodontitis may be systemic or local, and among them, smoking is the most significant[8,9]. Thus, cigarette smoke increases the oxidative burden, as it contains a large number of free radicals, and it has been suggested that it may increase the susceptibility to periodontal pathogens [10].

As smoking increases the risk of periodontitis, the present study aimed to evaluate the effect of smoking on oxidative stress in gingivitis and chronic periodontitis patients and also compare the levels to prove the significance of salivary NO levels on smoking which increases with increasing disease.

MATERIALS AND METHOD

The present study was conducted in the Department of Periodontology, Sree Balaji Dental College And Hospital,TamilNadu,Chennai,India.The institutional ethical committee of the faculty approved the study.

This cross-sectional study was performed to evaluate and compare the salivary NO levels of smokers and Non-smokers among the chronic periodontitis patients to those of clinically healthy patients as controls.

Sixty subjects who were in the age group of 30-55 years, who participated in this study participated and were divided into three groups: group I, which includes 20 healthy nonsmoking subjects; group II, 20 subjects who are Non-smokers with Chronic periodontitis ; Group III 20 subjects who are smokers with Chronic periodontitis.

Clinical examinations

This was performed using the plaque index (PI), gingival index (GI), probing pocket depth (PD) and clinical attachment level (CAL).The pocket depth was measured as the distance from the gingival margin to the base of the pocket in millimeters. Informed consent was obtained from all of the patients before participating in the study

Inclusion Criteria And Exclusion Criteria

The inclusion criteria which was followed generally were the patients of both genders who were in the age group of 30-55 years, with a dentition of at least 20 functioning teeth.

I. **CONTROLS:**

Inclusion criteria

Healthy subjects in the age group of 30 – 55years, with no probing pocket depth, with no bleeding on probing and no attachment loss.

Exclusion criteria

Patients who have received any topical or systemic antimicrobial treatment or steroid therapy in the past six months.Patients who had periodontal treatment in the past six months.Smokers- both past and present.Patients with any systemic diseases and Patients with salivary gland disorders.

II. STUDY GROUP: NON SMOKERS WITH CHRONIC PERIODONTITIS

Chronic periodontitis patients (nonsmokers) Subjects with ≥30% of sites with the presence of a PD of ≥4 mm along with a CAL of ≥4 mm .

III. STUDY GROUP: SMOKERS WITH CHRONIC PERIODONTITIS

Chronic periodontitis patients (smokers) Subjects having a smoking habit for the past 6 months or more

and smoking at least 10 bidis or cigarettes per day, and with ≥30% of sites with the presence of a PD of ≥4 mm along with a CAL ≥4 mm.

Exclusion criteria

Patients who have received any topical or systemic antimicrobial treatment in the past six months including the use of mouthwash

Patients who had periodontal treatment in the past six months.

Patients on anti-oxidant supplements in the past six months.

Patients with salivary gland disorders

Collection of samples:

4 mL of unstimulated saliva was collected in a sterile plastic vial, from all of the subjects and controls. The saliva samples were then centrifuged at 2,500 rpm, for 5 minutes. The biochemical estimation of NO in the collected supernatant obtained from the saliva was performed using the Griess colorimetric reaction by Green et al. [11]These solutions were added to the Griess reagent for measurement on as spectrophotometer and their optical densities (OD) were recorded[12,13]. The optical densities were then correlated in the standard curve and the corresponding concentrations of nitrite were observed.

RESULTS

The detailed data on the salivary levels of NO between the three groups have been listed in [Table/Fig 1]. The detailed data BY t-test for inter comparison three groups for Salivary Nitric oxide Levels have

been listed in [Table/Fig-2]. Clinical parameters used for clinical examinations of the three groups

have been listed in [Table/Fig-3].

Table 1. ANOVA test for Comparison between three groups for Salivary Nitric oxide

Groups	N	Mean	SD	Minimum	Maximum	F-value	P Value
Group I	20	5.69	0.93	4.34	8.16	234.021	0.001
Group II	20	15.43	2.42	10.48	18.94		
Group III	20	16.53	1.51	13.54	20.34		
Total	60	12.55	4.86	4.34	20.34		

P<0.01 Significant

Post Hoc Test of Salivary NO

Comparing the above three Groups, Group II & III has got highest mean value of Salivary levels of nitric oxide when compared to Group I. The above distribution of data shows statistical significance (p<0.01)

Table 2 - Scheffe Test: t-test for inter comparison three groups for Salivary Nitric oxide

Groups	N	Mean	SD	Minimum	Maximum	t-value	P Value
Group I	20	5.69	0.93	4.34	8.16	19.859	0.001
Group II	20	15.43	2.42	10.48	18.94		
Group I	20	5.69	0.93	4.34	8.16	27.352	0.001
Group III	20	16.53	1.51	13.54	20.34		
Group II	20	15.43	2.42	10.48	18.94	1.108	0.001
Group III	20	16.53	1.51	13.54	20.34		

P<0.01 SignificantFrom the above table ,the inter comparison among three group for Salivary levels of NO Shows,

t-test comparing group I and group II reveals group B has statistically significant higher mean value compared to group I (p<0.01)

t-test comparing group I and group III reveals group III has statistically significant higher mean value compared to group I (p<0.01)

t-test comparing group II and group III reveals group III has statistically significant higher mean value compared to group II (p<0.01)

Table 3. Clinical parameters used for clinical examinations of the three groups.

Parameter	Group 1 (n=20)	Group 2 (n=20)	Group 3 (n=20)
Plaque index	0.64±0.18 (0.40–1.00)	1.70±0.19 (1.30–2.10)	1.92±0.18 (1.60–2.20)
Gingival index	0.44±0.10 (0.30–0.60)	1.71±0.21 (1.30–2.20)	1.38±0.18 (1.10–1.70)
Probing pocket depth (mm)	0.84±0.21 (0.40–1.20)	4.35±0.56 (3.40–5.20)	4.59±0.48 (3.80–5.80)
Clinical attachment levels (mm)		6.51±0.40 (5.80–7.20)	6.53±0.41 (6.00–7.20)

Values are presented as mean±standard deviation (range).

Group 1: normal, group 2: nonsmoker, group 3: smoker.

There was positive significant increase in the salivary NO levels among smokers than non-smokers induced chronic periodontitis. the results indicated that there was a significant correlation on the effects of smoking in increased periodontal diseases.

DISCUSSION

Periodontal disease is a chronic bacterial infection characterized by persistent inflammation, connective tissue breakdown and alveolar bone destruction [14].

Nitric oxide (NO) is a gaseous free radical with a short biological half-life, which is generated enzymatically from L-arginine by a family of the NO synthase (NOS) isoforms. Nitric oxide (NO) is formed from the amino acid, L-arginine by a 2-step oxidation of L-arginine to L-citrulline. Nitric oxide is synthesized by a family of enzymes which are called nitric oxide synthases [15]. Excessive levels of NO, and consequent modification of proteins, lipids, and nucleic acids by reactive nitrogen species formed in the reaction of NO with O2-. NO reacts rapidly with O2- to form peroxynitrite, a highly toxic metabolite and a potent oxidant. Controlled generation of peroxynitrite may play a role in host defense, but excessive generation can lead to tissue damage.However, there is also peroxynitrite-independent mechanisms by which nitrotyrosine can be formed. The complexity of NO chemistry in part may help explain the sometimes opposing results obtained in the research of the role NO in pathogenesis of the diseases [16].

The expression of iNOS has been investigated in salivary gland-related diseases [17], temporomandibular joint disorders and oral cancer as well[18].Several studies suggest that tissue injury in inflammation involves induction of iNOS by certain cytokines or endotoxin, which leads to production of large quantities of NO [19].

As smoking increases the risk of periodontitis due to the destructive molecular and genetic factors[20], the present study aimed to evaluate the effect of smoking on oxidative stress in gingivitis and chronic periodontitis patients and also compare the levels to prove the significance of salivary NO levels on smoking which increases with increasing disease .

In the present study, we made an attempt to evaluate the roles of smoking and its effects in increasing periodontal diseases. Various studies have reported the significance of NO as an inflammatory marker, but the present study has correlated the salivary elevated levels of NO among the smokers and non-smokers in gingivitis and chronic periodontitis.

The source of salivary nitric oxide was studied by Sato H et al., 2006[21]. Many of the oral microorganisms express enzymes that can effectively reduce nitrate. The

facultative anaerobic bacteria in the oral cavity reduce the salivary nitrate to nitrite and this nitrite enhances the gastric generation of NO in acidic conditions. Although nitrite is converted non-enzymatically to NO at a low pH, the rate of this conversion at the physiological pH (about 6.2–7.6) in the oral cavity is fairly low and, hence, the mechanism of the oral production of NO remains obscure.

The source of serum nitric oxide was studied by Menaka et al., 2009 [12] . The results of this study showed significantly increased concentrations of nitrite in the patients with periodontitis, as compared to those in the healthy control group. The significantly higher levels of NO in this study group had contributed to the development of the frequently found clinical symptoms of periodontitis. The increased alveolar bone resorption may be due to the stimulatory effect of NO on the activity of the osteoclasts.

Interestingly, a study report of Aurer A et al., 2001[22], showed that salivary nitrite, a stable metabolite of NO, was decreased in the saliva of the periodontitis patients than in the healthy subjects. This may be due to the fact that NO is relatively unstable in the presence of oxygen and that it quickly autooxidizes to produce nitrogen oxides. Moreover, because of NO's reactivity and shortlife, directly measuring NO in the cells and tissues is very difficult.

Biochemical and immunological markers present in saliva, serum or GCF can partially determine the extent of periodontal disease and even may predict its progression (Ugar-cankal D et al 2006) [23]. Study resulted by Deeptiwadhwa et al.,2013 showed a positive corelation with the present study with significant increased concenterations of salivary nitric oxide in patients who have smoking habits in chronic periodontitis patients than non-smokers which was supported now with the present study that levels have increased with smoking and in increasing disease [6].

This study was performed to investigate the role of smoking as well to prove the influence of smoking on increasing periodontal disease by using an noninvasive tool as saliva to estimate the levels of NO as an potential bio marker for periodontal diseases.

CONCLUSION

To summarize, as the studies which have highlighted on effects of smoking in the role of increasing diseases are lacking and as for the biochemical tests, this study utilized easy chair side diagnostic tools i.e, saliva, this study was indicated to focus on the relationship of the salivary levels of NO among smokers and non-smokers in chronic periodontitis patients. The results of our study indicated that there was a direct positive correlation among smokers which may throw light on the future research to evaluate the effects of tobacco on various diseases effectively.

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REFERENCES

1. Nussler AK, Billiar TR. Inflammation, immunoregulation, and inducible nitric oxide synthase. J LeukocBiol 1993;54: 171-8.
2. Moncada S, Higgs A. The L-arginine-nitric oxide pathway. N Engl J Med 1993;329:2002-12.
3. Michael T, Feron O. Nitric oxide synthesis: which, where, how and why? J. Clin. Invest.1997:100(9);2146-52.
4. David TW: Salivary diagnostics powered by nanotechnologies, proteonomics and genomics, JADA. 2006; 137:313-21.
5. Nunn ME. Understanding the etiology of periodontitis: an overview of periodontal risk factors. Periodontol 2000 2003;32:11-23.
6. DeeptiWadhwa et al., Determination of levels of nitric oxide in smoker and nonsmoker patients with chronic periodontitis. J Periodontal Implant Sci 2013;43:215-220.
7. Manisundar N et al., Comparison of the Salivary and the Serum Nitric Oxide Levels in Chronic and Aggressive Periodontitis: A Biochemical Study. Journal of Clinical and Diagnostic Research. 2013 April, Vol-7(4): 000-0002.
8. Johnson GK, Hill M. Cigarette smoking and the periodontal patient. J Periodontol 2004;75:196-209.
9. Razali M, Palmer RM, Coward P, Wilson RF. A retrospective study of periodontal disease severity in smokers and non-smokers. Br Dent J 2005;198:495-8.
10. Epperlein MM, Nourooz-Zadeh J, Noronha-Dutra AA, Woolf N. Nitric oxide in cigarette smoke as a mediator of oxidative damage. Int J ExpPathol 1996;77:197-200.

11. Green LC, Wagner DA, Glogowski J, Skipper PL, Wishnok JS, Tannenbaum SR. Analysis of nitrate, nitrite, and [15N] nitrate in biological fluids. Anal Biochem 1982;126:131-8.
12. MenakaKB,RameshA,Thomas B, Kumari NS. Estimation of NO as an inflammatory marker in periodontitis. J Indian Soc Periodontal. 2009;13:75-8.
13. Sharma kv et al., Estimation of nitric oxide as a diagnostic marker of periodontal disease. JISP. 2003; 6(3):137-143
14. Page RC, Kornman KS: The pathogenesis of human periodontitis: an introduction, Periodontol 2000; 14:9, 1997.
15. Looms D, Tritsaris K, Pedersen AM, Nauntofte B, Dissing S, Nitric oxide signaling in salivary glands. Journal of Oral Pathol Med. 2002; 31(10): 569-84
16. Moncada S, Palmer RMJ, Higgs EA. Nitric oxide: physiology, pathophysiology and pharmacology. Pharmcol Rev1991; 43: 109–42.
17. Ruben Zamora, YoramVodovotz, and Timothy R. Billiar. Inducible Nitric Oxide Synthase and Inflammatory Diseases.Molecular Medicine 2000;6(5): 347–373.
18. clancy RM, Amin AR, Abramson SB. The role of nitric oxide in inflammation and immunity. Arthritis Pheum 1998;41:1141-1151.
19. Stichtenoth DO, Frolich JC. Nitric oxide and inflammatory joint diseases. Br J rheumatol 1998;37:246-257.
20. Ojima M, Hanioka T. Destructive effects of smoking on molecular and genetic factors of periodontal diseases. TobInduc Dis.2010; 369-373
21. Sato H, Takahashi M, Mutoh M, Shoji Y, Kamanaka Y, Naka M, Maruyama T, Sugimura T, Wakabayashi K. Suppressive effect of an inducible nitric oxide inhibitor, ONO-1714, on AOM-induced rat colon carcinogenesis. Nitric Oxide. 2006 Mar; 14(2):130-6.
22. Aurer A, Aleksic J, Ivic-Kardum M, Aurer J, Culo F. Nitric oxide synthesis is decreased in periodontitis. J ClinPeriodontol. 2001 Jun; 28(6):565-8
23. Ugar-Cankal D, Ozmeric N. A multifaceted molecule, nitric oxide, in oral and periodontal disease. Clinchimacta 2006;366(1-2):90-100.

Detection of Vancomycin MIC by Agar Dilution in Clinical Isolates of MRSA showing Reduced Zone of Inhibition by Disk Diffusion Method

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ABSTRACT

Introduction: *Staphylococcus aureus* is one of the most common causes of nosocomial infections, especially pneumonia, surgical site infections and blood stream infections and continues to be a major cause of community-acquired infections. Methicillin Resistant *Staphylococcus aureus* (MRSA) is resistant to the majority of antimicrobial agents available for clinical use, the glycopeptides vancomycin has been proposed as the drug of choice for treating such infections. The glycopeptide vancomycin was considered to be the best alternative for the treatment of multi drug resistant MRSA[4]. However, there are increasing numbers of reports indicating the emergence of vancomycin-resistant *S. Aureus*. Methicillin Resistant *Staphylococcus aureus* (MRSA) is resistant to the majority of antimicrobial agents available for clinical use, the glycopeptides vancomycin has been proposed as the drug of choice for treating such infections. **Materials and Method:** The present study was carried out to find out the presence of VISA and VRSA among 186 MRSA strains isolated from clinical specimens. Minimal inhibitory concentration (MIC) of vancomycin was determined by agar dilution method in Muller Hinton agar. **Results:** The MIC for 169 of 186 isolates (90.86%) for vancomycin was ≤2 mg/l indicating VSSA. 11(5.91%) isolates showed an MIC range between 4-8 mg/l, indicating VISA. Out of 11 VISA isolates the MIC for 6 (0.32%) isolates was in the range of >16mg/l indicating that VRSA. **Conclusion:** The present study reveals the emergence of VRSA in tertiary care hospitals. Continuous efforts should be made to prevent the spread and emergence of glycopeptides resistance by early detection of the resistant strains and using proper infection control measures in hospital settings.

Keywords: *Staphylococcus aureus*, MRSA, MIC,VRSA, VISA,

INTRODUCTION

Staphylococcus aureus is considered as a major pathogen causing a diversity of infections including bacteremia, pneumonia, skin and soft tissue including osteoarticular infections. Since 1961, Methicillin Resistant Staphylococci aureus (MRSA) emerged has one of the major and common cause of hospital acquired infection.[1,2] *The* emergence of *Methicillin-resistant S. aureus* (MRSA) has posed a serious therapeutic challenge.[3] The first case of MRSA was reported in 1961, these MRSA isolates are usually resistant to multiple classes of antimicrobial agents including macrolides, lincosamides, tetracyclines, fluroquinolones and aminoglycosides and it has made the therapy of staphylococcal disease a global challenge. The glycopeptide vancomycin was considered to be the best alternative for the treatment of multi drug resistant MRSA .[4, 5, 6, 7]

Since the emergence of vancomycin resistance in enterococci in 1988 and its *in vitro* demonstration that its resistance genes (*Van A and Van B*) are transmissible

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to other bacterial species including *S.aureus*. In 1997, the first case of vancomycin intermediate S. aureus (VISA) was reported in Japan, exhibiting two different resistance mechanisms. Initially vancomycin-intermediate *S. aureus* (VISA). From that time forward, more cases of VISA, and of vancomycin resistant S. aureus (VRSA). The resistance was believed to be due to the thickened cell wall, where many vancomycin molecules were trapped within the cell wall. The trapped molecules clog the peptidoglycan meshwork and finally form a physical barrier towards further incoming vancomycin molecules. The second, noted in United States in 2002 among *S. aureus*, was identical to the mechanism seen in vancomycin-resistant *Enterococcus*. Vancomycin-resistant *Enterococcus faecium* harbours the vanA operon, which contains five genes, *Van*S, -R, -H, -A and -X. But Tiwari and Sen have reported a VRSA which is van gene-negative. Subsequent isolation of VISA and VRSA isolates from other countries including Brazil, France, United Kingdom, Germany, India and Belgium has confirmed that the emergence of these strains is a global issue.[7,8]

The aim of the present study was to determine the Minimum Inhibitory Concentration of vancomycin to *Staphylococcus aureus* strains isolated from different clinical specimens exhibiting reduced zone of inhibition with vancomycin(30 µg) by disc diffusion test and to determine the antibiogram of these isolates to different antimicrobial agents.

MATERIALS AND METHOD

***Staphyloccus aureus isolates*:** A total of 186 consecutive isolates of *S.aureus* were obtained from clinical specimens (pus, urine, sputum, throat swabs, blood, C.S.F, catheter tip, and body fluids) were collected between January 2014 to April 2017 in the Department of Microbiology, Sri Lakshminarayana Institute of Medical Sciences,Pondicherry, were included in the study. All the isolates were identified as *S. aureus* by culture and biochemical tests which included test for clumping factor, slide and tube coagulase test and mannitol fermentation.

Antibiotic susceptibility testing: Antibiogram was determined by the Kirby–Bauer disc diffusion method using different antimicrobial agents e.g., Penicillin (10 units), Ampicillin (10µg), Amikacin (30µg), Cefotaxime (30µg), Cefoxitin (30µg), Clindamycin (2µg), Ciprofloxacin (10µg), Erythromycin (15µg), Gentamicin (50µg), Linezolid (30 µg), Oxacillin (1µg), Vancomycin (30µg), (Hi-media).

S.aureus isolates showing reduced zone of inhibition to vancomycin (30µg) were subjected to MIC determination by agar dilution test. The diameter of zone of inhibition was compared with CLSI zone size interpretative chart. ATCC 29213 was used as reference strains for VSRA. The test strain was considered as sensitive if zone size was ≥ 15mm and was considered as resistant if zone size was <15 mm.

Determination of MIC: Minimal inhibitory concentration (MIC) of vancomycin was determined by agar dilution method in Muller Hinton agar according to the guidelines of CLSI (9). Vancomycin gradient plates were prepared in Mueller-Hinton agar (Hi-media) concentration ranging from (0.5-256 mg/l). Compare 18-24 h old culture with 0.5 McFarland standard. Spot 0.01 ml of inoculum using a calibrated loop on to gradient plates. Plates were incubated at 37°C for 48 h. before assessing the visible growth, *S. aureus* ATCC 25923 was used as control. Before reading and interpreting the results, growth control and results with quality controls mains were checked. The lowest concentration that inhibited visible growth is the minimum inhibitory concentration (MIC) of vancomycin.

CLSI MIC interpretative criteria for vancomycin in *S.aureus* is, Vancomycin susceptible *S.aureus* (VSSA): ≤2µg/mL, Vancomycin intermediate *S.aureus* (VISA) : 4-8µg/mL Vancomycin resistant *S.aureus* (VRSA) : ≥16µg/mL. [9, 10]

RESULTS

Out of 186 clinical isolates, 127 (68.2%) patients were from male and 59 (31.7%) were female patients. The male to female ratio in the present study was 2:1. Majority of the patients were of age 51-60 years.

Out of the total 186 samples 329 samples were pus, 216 samples were urine, 26 blood samples, 23 sputum samples, 65 catheter tip samples, body fluids 59 sample, 7 from throat swabs, CSF sample 9, as shown in (***Table: 1***).

Table- 1: Characteristics of specimens

Characteristics	No.	Percentage
I. Age(yrs):		
1 -10	78	9.0%
11-20	87	10.0%
21-30	64	7.4%
31-40	89	10.3%
41-50	116	13.4%
51-60	157	18.3%
61-70	139	16.1%
71-80	131	15.1%
81-90	1	0.11%
II. Distribution of samples		
Pus	52	27.9%
Urine	64	34.4%
Sputum	23	12.3%
Blood	3	1.6%
Body fluids	22	11.8%
Catheter tips	16	8.6%
Throat swab	6	3.2%

The Minimum inhibitory concentration for 169 of 186 isolates (90.86%) for vancomycin was ≤2 mg/l indicating that all were sensitive to vancomycin (VSSA). 11(5.91%) isolates showed an MIC range between 4-8 mg/l, indicating vancomycin intermediate resistance (VISA). Out of 11 VISA isolates 7 were from urine, and 3 from pus and 1 from blood sample. For the remaining 6 (0.32%) isolates, the MIC was in the range of >16mg/l indicating that these six isolates were vancomycin resistant (VRSA) (***Table: 2***). VRSA strains was isolated from urine, pus and blood samples. All these 6 isolates were sensitive to Linezolid, Imipenem and Clindamycin in common.

Table- 2: Distribution of MIC of Vancomycin of VRSA and VSSA among MRSA Isolates Detected By Disc Diffusion Method.

MIC (µg g/ml) of Vancomycin						
	<2mg/l	**4 mg/l**	**8mg/l**	**16mg/l**	**32mg/l**	**Total**
VSSA	169 (90.86%)	-	-	-	-	169 (90.86%)
VISA	-	7(3.76%)	4(2.15%)	0	0	11(5.91%)
VRSA	-	-	-	4(2.15%)	2(1.07%)	6(0.32%)

Antibiotic Susceptibility Pattern: Antibiogram of S.aureus showed highest resistance to Ampicillin 92%, followed by, VRSA isolates were susceptible to Tetracyclin, Erythromycin, Gentamicin, Cotrimoxazole and Linezolid. All the six Vancomycin Resistant *Staphylococcus aureus* were sensitive to Linezolid and Imipenem in common.

DISCUSSION

Infections caused by methicillin-resistant *S. aureus*

have been associated with high morbidity and mortality rates. Vancomycin is the main antimicrobial agent available to treat serious infections with MRSA but unfortunately, decrease in vancomycin susceptibility of *S. aureus* and isolation of vancomycin-intermediate and resistant *S. aureus* have recently been reported from many countries. Different methods available to determine the vancomycin MIC to *S. aureus* vary in their sensitivity and specificity . Broth microdilution (BMD) recommended by the CLSI is considered to be the gold standard. Agar dilution method is also recommended.[5,12]

Among the 186 isolates 127 (68.2%) were from male patients and 59 (31.7%) were female patients. Male to female ratio was 2:1. The high frequency of infections among males could be due to their outdoor occupation, more prone for injuries, smoking and due to exposure to contaminated environment. A similar findings has been reported by T.N.Ravi et al., who has reported a male to female ratio of 2:1. [13]

Majority of cases are between 51-60 years, this may be because of waning immunity. The MIC value of 186 isolates varied from 0.5-32 µg/mL. 169 strains had MIC between 0.5-2 µg/mL (VSSA), 11 strains had MIC between 4-8 µg/ mL (VISA) and 6 strains had MIC of 32 µg/mL (VRSA).

In our study 169 (90.86%) out of 186 showed susceptibility at < 2mg/l, by agar dilution, indicating sensitive to vancomycin. A study by Jyothi Kumari et al from manipal reported almost similar findings 94/98 (95.9%) were vancomycin susceptible (MIC ≤2 µg/ml) by agar dilution method.[12]

We reported 11 VISA and 6 VRSA in our study, similarly A study by Venubabu Thati et al from south India studied 358 isolates showing reduced zone of inhibition. They reported and seven isolates as VRSA vancomycin MIC in the range of 16-64 mg/L.[8]

CONCLUSION

The present study reveals the emergence of VRSA in tertiary care hospitals. Continuous efforts should be made to prevent the spread and emergence of glycopeptides resistance by early detection of the resistant strains and using proper infection control measures in hospital settings. Hospital infection control committee should be formed in every tertiary health care centres for immediate response from the concerned authorities to check further emergence and spreading of these notorious VRSA strains.

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REFERENCES

1. Denis O, Nonhoff C, Byl B, Knoop C, Bobin-Dubreux S, Struelens MJ. Emergence of vancomycin intermediate staphylococcus aureus in a Belgian hospital: Microbiological and clinical features. J Antimicrob Chemother. 2002;50:383-91.
2. National Nosocomial Infections Surveillance (NNIS). System report, data summary from January 1990 - May 1999. Am J Infect Control. 1999 June;277:520-32.
3. Shilpa Arora, Pushpa Devi, Usha Arora, and Bimla Devi. Prevalence of Methicillin-resistant Staphylococcus aureus (MRSA) in a Tertiary Care Hospital in Northern India. Journal of Laboratory Physicians. 2010 Jul-Dec; 2(2): 78-81.
4. Harkins CP, Pichon B, Doumith M, et al. Methicillin-resistant Staphylococcus aureus emerged long before the introduction of methicillin into clinical practice. Genome Biol. 2017;18(1):130. Published 2017 Jul 20. doi:10.1186/s13059-017-1252-9.
5. Shahana Khanam, Jalaluddin Ashraful Haq, SM Shamsuzzaman, Md Motlabur Rahman, Kazi Zulfiquer Mamun.Emergence of Vancomycin Resistant Staphylococcus aureus during Hospital Admission at a Tertiary Care Hospital in Bangladesh.2016;3(1):11-16.
6. P Bhateja, T Mathur, M Pandya, T Fatma, A Rattan. Detection Of Vancomycin Resistant Staphylococcus aureus: A Comparative Study of Three Different Phenotypic Screening Methods. Indian Journal of Medical Microbiology.2005;23 (1):52-55.
7. Nada ElSayed , Medhat Ashour , Amira Ezzat Khamis Amine. Vancomycin resistance among Staphylococcus aureus isolates in a rural setting, Egypt. GERMS .2018;8(3) :page 134.
8. Thati, Venubabu et al. "Vancomycin resistance

among methicillin resistant Staphylococcus aureus isolates from intensive care units of tertiary care hospitals in Hyderabad" Indian journal of medical research.2011:134(5);704-708.

9. Clinical Laboratory Standards Institute (CLSI) Performance standards for antimicrobial susceptibility testing. 18th International supplement. CLSI document M 100-18, Wayne, Pennsylvania, 2008.
10. P. Sreenivasulu Reddy*, Maria Sindhura John, P. Vasundhara Devi, B. Siva Prasad Reddy. Detection of vancomycin susceptibility among clinical isolates of MRSA by using minimum inhibitory concentration method. Int J Res Med Sci. 2015 Jun;3(6):1378-1382.
11. Robert A. Weinstein et al. Vancomycin-Intermediate and -Resistant Staphylococcus aureus: What the Infectious Disease Specialist Needs to Know. Clinical Infectious Diseases.2001;32(1):108-115.
12. Jyoti Kumari et al. Comparison of E-test And Agar Dilution For Determining Minimum Inhibitory Concentration Of Vancomycin To Healthcare-Associated Methicillin-Resistant Staphylococcus Aureus. Asian J Pharm Clin Research.2016;9(4):189-191.
13. T.N.Ravi, V.Praveen Kumar, B.V.Ramana. Determination of Vancomycin MIC In Staphylococcus aureus For Isolates Showing Reduced Zone Of Inhibition By Disc Diffusion Method. Indian Journal of Applied Research.2018 july;8(7):704-708.

Effect of Intravenous Dexmedetomidine on Spinal Anaesthesia with Hyperbaric Bupivacaine in Lower Limb Orthopedic Surgeries - A Randomized Controlled Study

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ABSTRACT

Introduction: Alpha -2 adrenoceptor agonists such as Clonidine, dexmedetomidine both have analgesic and sedative properties when used intravenous. Unsatisfactory regional anesthesia necessitates supplementary intravenous analgesia and deep sedation to relive anxiety

AIM: To observe the effect of intravenous dexmedetomidine in spinal anaesthesia with respect to sensory block, motor block, depth of sedation and the time to first analgesic requirement in lower limb orthopedic surgeries.

Materials and Method: 60 consenting patients undergoing lower limb orthopaedic surgeries were selected. Dexmedetomidine group (D) received a loading dose of 0.5 mcg/kg dexmedetomidine over 10 mins before spinal anaesthesia followed by an infusion of 0.5 mcg /kg/hr till the end of surgery. Control group 'C' received similar volume of normal saline infusion. The parameters observed were the highest sensory level achieved, time to two segment regression, duration of motor block and time to first requirement of analgesia. Ramsay score was used to assess sedation and hemodynamic parameters noted.

Results: The maximum sensory level achieved was higher in group 'D' than in group 'C'. The time to two segment regression, The duration of motor block and The time to first requirement of analgesia was prolong in dexmedetomidine then in control group. Also the sedation score were higher in group 'D'.

Conclusion: I.V. Dexmedetomidine as an adjuvant in spinal anaesthesia prolongs the duration of both sensory and motor blockade and also delays the time to rescue analgesia, thus eliminating the need to use multiple drugs for sedation and analgesia.

Keywords: *α-2 Adenoreceptor, Dexmedetomidine, Spinal anaesthesia, Ramsay sedation score, analgesia.*

INTRODUCTION

Spinal anesthesia has the advantage of avoiding the difficulties in airway management and also is superior to general anesthesia in post anesthesia pain relief. But failures in regional anesthesia is attributable more to inadequate sedation and relief of anxiety than technical faults. Adequate sedation will not only relieve the anxiety of the patient but also improves physiological and psychological stress and the satisfaction of both the surgeon and patient. [1]

Several additives such as opioids, alpha agonists among others have been used with local anaesthetics to prolong the duration of spinal anaesthesia. Alpha -2 adrenoceptor agonists such as clonidine have been studied as adjuvants to spinal anaesthesia with promising results. They have both analgesic and sedative properties when used as an adjuvant to regional anaesthesia.[2-4]

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Dexmedetomidine is a more selective alpha -2 adrenoceptor agonist with sedative and analgesic properties. The analgesic action of dexmedetomidine has been found to be exerted both at spinal and supraspinal levels.[5] It has been found to reduce the anaesthetic requirements and have opioid sparing properties upto 90% when used as an adjunct to general anesthesia [6-8] Dexmedetomidine when used intravenously as an adjuvant to spinal anesthesia with prilocaine or ropivacaine has also been reported to prolong the duration of sensory and motor blockade.[9-10]

The primary aim of our study was to assess the duration of spinal anesthesia (sensory and motor blockade). In this study we are hypothesizing that intravenous dexmedetomidine as an adjuvant to spinal anesthesia could provide prolonged post-operative pain relief.

MATERIALS AND METHOD

A randomized double blinded control study was conducted in 60 consenting patients undergoing lower limb orthopedic surgeries. After approval of institutional ethics committee 60 patients were randomly allocated to study or control group using computer-generated random list. Patients of ASA physical status I and II, aged between 18 and 75 years were included in the study. Patients with hypersensitivity to local anesthetics, coagulation disorders, significant co-existing cardiovascular or hepatorenal diseases, pre-existing neurological diseases and local infection at the puncture site were excluded from the study.

A written and informed consent was taken from all patients. A detailed history and thorough physical examination was done in all consenting patients. The patients were explained about the methods for assessing the sensory and motor blockade. Inside the operating room, intravenous line was secured with appropriate gauge cannula and ringer's lactate infusion started prior to the commencement of the procedure at the rate of 10ml/kg body weight. Standard monitors were connected namely electrocardiography, pulse oximeter and non – invasive blood pressure and baseline vitals were noted.

The study group 'D' received a loading dose of intravenous dexmedetomidine of 0.5 mcg/kg diluted to 20ml in normal saline over 10 minutes. The control group 'C' received same volume of normal saline. Immediately after the loading dose the patient was positioned in either lateral or sitting position. Subarachnoid block was performed at L3- L4 level. After skin infiltration with 2% lignocaine, 14mg (2.8 ml) of 0.5% heavy bupivacaine was injected intrathecally through 25 guage spinal needle. Then the patient was positioned supine on the operating table. After subarachnoid block the patients in group 'D' received dexmedetomidine infusion at 0.5 mcg/kg/hour till the end of surgery. The patients in group 'C' received normal saline infusion at the same rate till the end of surgery.

The anesthesiologist marking the sensory level was blinded to drug given intravenously. Pulse rate, blood pressure and oxygen saturation was recorded every 2 minutes for first 10 minutes and every 5 minutes for next 30 minutes and every 10 minutes for next 40 minutes and at end of procedure. Hypotension(defined as systolic blood pressure <90 mm Hg or 20 % fall in blood pressure from baseline or mean arterial pressure lower than 60 mm hg) was treated with additional ringer lactate and bolus dose of intravenous mephentermine 6mg. Bradycardia defined as heart rate less than 50 per minute was treated as per ACLS algorithm. Nausea or vomiting was treated with antiemetics intravenous ondansetron 4 mg and hypoxia defined as decrease in SpO2 to 90% was treated with supplemental oxygen by mask.

Assessment of sensory blockade was by loss of temperature sensation to cold using a cotton swab soaked in spirit. Sensory level was checked every 2 minutes and the level noted at 20 minutes after the block. Highest level of sensory blockade after the drug given, time for two dermatome regression (duration) was noted. Assessment of motor blockade tested by Bromage scale and degree of motor blockade and duration of motor blockade were noted.

Motor block in the lower limb was assessed by using a modified Bromage scale.[11]Assessment of sedation was done using Ramsay sedation score [12]

Score was evaluated every 10 minutes for 30 minutes after the drug is given and every 15 minutes for next 30 minutes and at the end of procedure. Excessive sedation was defined as a score greater than 4/6. All the above tests were performed while monitoring and recording hemodynamic status of the patient.

Pain score was done using visual analogue scale in postoperative period. Patients were educated pre-

operatively on the usage of Visual Analogue Scale (VAS) and reminded in the postoperative period to alert the investigator when the VAS is greater than 3. First dose of analgesia was given when VAS score was greater than 3. The choice of the drug was deemed appropriate by the treating consultant. Time required for the first dose was noted. The time required was calculated from the time of administration of subarachnoid block to the first complaint of pain.

Statistical analysis; analysis was performed using SSPS 17 software. Student's unpaired T-test was used for analysis of mean age, height and weight distribution, duration of surgery, duration of motor blockade, time to 2 segment regression, rescue analgesic time, Ramsay sedation score. Fisher's exact test was used for gender, level after 20 minutes, highest sensory level. P value <0.05 was considered statistically significant.

OBSERVATIONS AND RESULTS

All the demographic data were comparable in both the groups [Table 1]. Using fisher's exact test as the statistical comparison between the two groups it was found p value=0 .0001. It signifies level after 20 minutes of spinal block in the study group to be highly significant with 43.3% of the patients achieving T8 level. Whereas in control group 46.7% of the patients achieved only T9 level [Table 2]. Highest Sensory level achieved was very highly significant in study group compared to that of control group based on statistical analysis (p value< 0.001). 43.3% of the patients in the study group achieved T6 level and 40% of the patients achieved T7 level whereas in the control group 70% of the patients achieved T9 level.

Mean duration of motor blockade was significantly higher in study group 191.8 mins than in control group where the mean duration was 160.73 mins. [Table 3]. Applying student unpaired t test, p value was found to be <0.0001 implying time to two segment regression was very highly significant in study group. The mean time was 157.9 mins in the study group compared to 111.0 mins in the control group. [Table 3]. Ramsay sedation score intraoperatively was 4.033 mean in the study group significantly higher than the control group where the mean was 2.033, [Table 3]. Mean time for analgesic dose was found to be higher in study group and p value < .0001 implying time for first requirement of analgesia was significantly prolonged in study group. Three patients in study group were found to have bradycardia. Using fisher's extract test it was found that p value=.119 implying statistically not significant. [Table 4]. Five patients in study group had hypotension which was significant with p value of 0.026 using fisher's extract test. [Table 4]

Table 1: Demographic Data.

	Study group Mean ± SD	**Control group Mean ± SD**	**p value**
Age(yrs)	46.83±9.61	48.83±9.53	0.42, NS
Weight(kg)	61.53±5.28	64.40±5.37	0.062, NS
Height(cms)	162.66±6.25	162.46±5.96	0.90, NS

SD-Standard deviation, NS-not significant

Table 2: Level of Sensory Block after 20 minutes of spinal Anesthesia.

		Study group N(%)	**Control group N(%)**	**Total**
Level after 20 minutes of spinal block	T_7	8(26.7%)	0(0%)	8(13.3%)
	T_8	13(43.3%)	3(10%)	16(26.7%)
	T_9	6(20%)	14(46.7%)	20(33.3%)
	T_{10}	3(10%)	11(36.7%)	14(23.3%)
	T_{11}	0(0%)	2(6.7%)	2(3.3%)
Total		30(100%)	30(100%)	60(100%)

N- Number of Participants

Table 3: Effect of dexmedetomidine, on Duration of motor block, time to two segment regression and Sedation

	Study group Mean ± SD	**Control group Mean ± SD**	**p value**
Duration of motor block (min)	191.8 ± 10.53	160.73 ± 11.87	<0.001, HS
Time to two segment regression (min)	157.96±11.64	111.50±8.48	<0.001, HS
Ramsay sedation score	4.033±0.183	2.033±0.183	<0.001, HS

SD- Standard deviation Fishers exact test p= .0001, HS- Highly Significant.

Table 4: Incidence of Bradycardia, Hypotension

		study group N (%)	**control group N (%)**	**Total N (%)**
Bradycardia	A	27(83.3%)	30(100%)	57(95%)
	P	3(10%)	0(0%)	3(5%)
Hypotension	A	25(83.3%)	30(100%)	55(91.7%)
	P	5(16.7%)	0(0%)	5(8.3%)

DISCUSSION

Dexmedetomidine has been used as an intravenous adjunct to spinal anesthesia in this study to observe the effect on the characteristics of spinal anesthesia.

All the patients in this study were comparable with respect to demographic profiles. The sensory level after 20 minutes of spinal block and the maximum sensory level achieved in the study group was found to be higher and statistically significant. Similar results were observed by Kaya *et al*[13] where the highest sensory level achieved was more in dexmedetomidine group. Harsoor *et al*[14] found that dexmedetomidine hastens the onset of sensory blockade but no statistically significant difference in the maximum sensory level achieved. The dose of bupivacaine used in our study was higher (14mg) compared to 12.5mg of bupivacaine used by Harsoor *et al*[14]. Dexmedetomidine's actions at alpha-2 receptors in the spinal cord by inhibiting nociceptive impulse transmission both pre-synaptically and post synaptically might probably be the reason for the higher sensory level achieved in our study.

Single loading dose of dexmedetomidine at 1 mcg/kg as an adjunct to spinal anesthesia has been found to prolong the time for two segment regression by Hong JY *et al.*[15]Tekin *et al*[9] found the two segment regression time to be significantly prolonged in the dexmedetomidine group (loading dose of 1mcg/kg followed by infusion at 0.4mcg/kg/hr). Our study also corroborates the findings of previous studies in that the mean time for two segment regression was 157.9mins as compared to 111.5mins of control group.

Kaya et al[13] used a single loading dose of 1mcg/kg of dexmedetomidine and did not find any significant increase in motor blockade in their study. Similarly Lugo et al[16] did not report any effect on motor blockade though they had used dexmedetomidine bolus 1mcg/kg followed by infusion at 0.5mcg/kg/hr. The mean duration of motor blockade in our study group (191.8mins) was significantly higher than control group and these findings correlate Well with those of Harsoor et al[14]and Al Mustafa et al[17]. The prolongation of motor blockade observed in our study might be attributed to the continous infusion of dexmedetomidine throughout the duration of surgery.

In our study, the sedation scores were significantly higher in the study group (mean 4.03) compared to control group (mean 2.03). But there was no respiratory depression observed in any patient in our study. Tekin et al[9] have observed that deeper sedation was induced in study group than control group, indicating that dexmedetomidine may reduce the need for extra sedative agents. The sedative and hypnotic effects of dexmedetomidine may be due to its inhibition of norepinephrine release in locus ceruleus.

The mean time for recue analgesia in our study in dexmedetomidine group was 241.0 mins whereas in control group the mean was 129.4 mins. This show dexmedetomidine also provide sufficient analgesia in postoperative patients, similar results also seen by Kaya et al[13] concluded that the addition of intravenous dexmedetomidine before spinal block provided similar pain relief with delayed-onset of postoperative pain and significantly less analgesic requirements .This may be attributed to the fact that the stimulation of the alpha2-adrenoceptors at Locus Ceruleus, which is the site of origin for the descending medullospinal noradrenergic pathway, known to be an important modulator of nociceptive neurotransmission, terminates the propagation of pain signals leading to analgesia[18].

Postsynaptic activation of alpha-2 adrenoceptors in the CNS results in decrease in sympathetic activity leading to hypotension and bradycardia[18]. In our study 5 patients in the study group had hypotension accounting to 16.7% incidence. This was found to be statistically significant with p value 0.026. Whereas only 3 patients in the study group had bradycardia with incidence of 10% and this was not statistically significant (p value 0.119). Elcicek *et al*[10] found the incidence of bradycardia in study group to be 30% and the mean arterial pressures were significantly lower in group I (study) than group II. Kaya et al[13] observed no biphasic change or significant cardiovascular variability in their study.

CONCLUSION

Dexmedetomidine when used as an intravenous 0.5mcg/kg loading dose followed by 0.5mcg/kg/hr. intravenous infusion in spinal anesthesia prolongs the duration of both sensory and motor block, provides sufficient sedation and also delays the time to rescue analgesia thus eliminates the need to use multiple drugs for sedation and analgesia

Ethical Clearance: Taken From Institutional Ethical Committee

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REFERENCES

1. Ok HG, Baek SH, Baik Sw, Kim HK, Shin SW, Kim KH. Optimal dose of dexmedetomidine for sedation during spinal anesthesia. Korean J Anesthesiol. 2013;64:426–31.
2. Mikko Pitkänen. Spinal (Subarachnoid) blockade. In: Cousin MJ, Bridenbaugh PO, Carr DB, Horlocker TT, editors. Neural Blockade in Clinical Anaesthesia and Management of Pain. 4 th ed. Philadelphia: Lippincot Williams and Wilkins; 2009.213-38.
3. Rhee K, Kang K, Kim J, Jeon Y. Intravenous clonidine prolongs bupivacaine spinal anesthesia. Acta Anaesthesiol Scand. 2003;47:1001–5.
4. Bonnet F, Buisson VB, Francois Y, Catoire P, Saada M. Effects of oral and subarachnoid clonidine on spinal anesthesia with bupivacaine. Reg Anesth. 1990;15:211–4.
5. Jorm CM, Stamford JA. Actions of the hypnotic anaesthetic, dexmedetomidine, on noradrenaline release and cell firing in rat locus coeruleus slices. Br J Anaesth.1993;71: 447–9
6. Reves JG, Glass PS, Lubarsky DA, McEvoy MD, Martinez-Ruiz R. Intravenous anesthetics. In: Miller RD, Eriksson LI, Fleisher LA, Wiener-Kronish GP, Young WL, editors. Miller's Anaesthesia. 7thed. Philadelphia, PA: Elsevier Churchill Livingstone;2010. p.756.
7. Fragen RJ, Fitzgerald PC. Effect of dexmedetomidine on the minimum alveolar concentration (MAC) of sevoflurane in adult's age 55 to 70 years. J Clin Anesth.1999; 11:466–70.
8. Aho M, Erkola O, Kallio A, Scheinin H, Korttila K. Dexmedetomidine infusion for maintenance of anesthesia in patients undergoing abdominal hysterectomy. Anesth Analg. 1992;75:940-6.
9. Tekin M, Kati I, Tomak Y, Kisli E. Effect of Dexmedetomidine IV on the Duration of Spinal Anesthesia with Prilocaine: A Double-Blind, Prospective Study in Adult Surgical Patients. Current Therapeutic Research. 2007 Sep; 68(5): 313–24.

10. Elcicek K, Tekin M, Kati I. The Effects of intravenous dexmedetomidine on spinal hyperbaric ropivacaine anesthesia. J Anesth. 2010;24:544–8.
11. Bromage PR, Burfoot MF, Cromwell DE, Pettigrew RT. Quality of epidural blockade. I: Influence of physical factors. Br J Anaesth. 1964;36:342–52.
12. Ramsay MA, Savege TM, Simpson BR, Goodwin R. Controlled sedation with alphaxalone-alphadolone. Br Med J 1974;2:656-9.
13. Kaya FN, Yavascaoglu B, Turker G, Yildirim A, Gurbet A, Mogol EB, et al. Intravenous dexmedetomidine, but not midazolam, prolongs bupivacaine spinal anesthesia. Can J Anaesth. 2010;57:39–45.
14. Harsoor SS, Rani DD, Yalamuru B, Sudheesh K, Nethra SS. Effect of supplementation of low dose intravenous dexmedetomidine on characteristics of spinal anaesthesia with hyperbaric bupivacaine. Indian J Anaesth 2013;57:265-9.
15. Hong JY, Kim WO, Yoon Y, Choi Y, Kim SH, Kil HK. Effects of intravenous dexmedetomidine on low-dose bupivacaine spinal anaesthesia in elderly patients. Acta Anaesthesiol Scand. 2012;56:382–7.
16. Lugo VW, Gomez IA, Cisneros-Corral R, Martinez-Gallegos N. Intravenous dexmedetomidine versus intravenous clonidine to prolong bupivacaine spinal anaesthesia. A double blind study. Anestesia en Mexico 2007;19:143-6.
17. Al-Mustafa MM, Badran IZ, Abu-Ali HM, Al-Barazangi BA, Massad IM, Al-Ghanem SM. Intravenous dexmedetomidine prolongs bupivacaine spinal analgesia. Middle East J Anesthesiol. 2009;20:225–31.
18. Gertler R, Brown HC, Mitchell DH, Silvius EN. Dexmedetomidine: a novel sedative-analgesic agent. Proc (Bayl Univ Med Cent) 2001;14:13-21.

Evaluation of the Effect of Menopause on Saliva and Dry Mouth- A Cross Sectional Study

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ABSTRACT

Objective: This study was performed to evaluate the effect of menopause on saliva and oral health. Salivary flow rate and pH of stimulated whole saliva, oral sign of dryness were determined in regularly menstruating and postmenopausal women who are not on hormone replacement treatment.

Study design :A cross-sectional study design was undertaken with a sample size of 60 subjectsfrom whom Paraffin stimulated whole salivary samples were collected to record salivary flow rate and pH.sixty subjects are divided equally into two groups:-GROUP A The control group included 30 regularly menstruating healthy women (premenopausal women) (age range: 25-40 years).GROUP B The study group included 30 post menopausal women (age range: 45-52years).Immediately after collection, pH was determined by dipping pH test paper directly into the sample of oral fluid. Oral sign of dryness was recorded respectively.

Statistical Analysis and Results: Salivary flow rate and pH values of the postmenopausal women were significantly lower than those of the control group (p=0.0001). Clinical Sign of oral dryness is significantly higher among the post menopausal women than that of the control group ($p \leq 0.0001$).In our study we found salivary flow rate significantly lower in the post-menopausal women in comparison with the menstruating women and it was also observed that the salivary pH of the post-menopausal group was significantly lower than that of the control group

Conclusion: Saliva being an easy diagnostic tool would serve as andiagnostic tool of hypo-salivation which is the most commonest oral changes during menopause.

Keywords: *menopause, saliva, flow rate, dryness,hypo salivation.*

INTRODUCTION

DEFINITION: Natural menopause is defined as a spontaneous cessation of natural menstruation for 12 consecutive months at 45-55 years of age (mean 50-52) [1] .Formally, menopause is the moment of the final menstruation, directly preceded by the permanent cessation of ovarian follicular function [2,3]. The average age of a woman at menopause is 51 years [4].

Menopause results from reduced secretion of the ovarian estrogen, which takes place when ovarian follicles are depleted through genetically controlled apoptosis of the ovarian cells. During the menopausal transition the level of inhibin B originating from the follicles decreases and the levels of pituitary follicle-stimulating hormone (FSH) and luteinizing hormone (LH) increase. Nevertheless, hypoestrogenism is the ultimate outcome of menopause. With increasing age, the levels of FSH and LH continue to rise for several

years, but in later menopause these levels decrease [5].

WHO has defined three age stages of midlife age for women (Research on the menopause. WHO 1997)[6]: "1) Menopause is the year of the final physiologic menstrual period retrospectively designated as 1 year without flow (unrelated to pregnancy or therapy) in women aged ≥ 45 years.

2) Premenopause begins at ages 35 to 39 years; during this stage, decreased fertility and fecundity appear as the first manifestations of ovarian follicle depletion and dysfunction, despite the absence of menstrual changes.

3) Perimenopause includes the period of years immediately before the menopause and the first year after the menopause."

The term postmenopause is defined as the prolonged period of hypergonadotropichypogonadism after menopause. Postmenopause is further divided into two different stages: early postmenopause, when estrogen is swiftly declining, and late postmenopause, when prolonged hypoestrogenism exists [7].

The principal peri- and postmenopausal oral symptoms are dry mouth, sensation of painful mouth (PM) due to various causes and less frequently burning mouth syndrome (BMS). Other symptoms which are commonly linked to the climacteric stage are mood swings, urogenital dryness, tiredness, joint and muscle pains, dizziness, irritability and insomnia[8,9].

The sensation of Dry Mouth or xerostomia is defined as a subjective sensation of dryness in the mouth [10]. Xerostomia is a major complaint for many elderly individuals and Women seem to suffer from xerostomia or hyposalivation more often than men[11]. However, there is no convincing evidence that age alone is a significant cause of xerostomia. The prevalence of xerostomia is difficult to determine. According to a review article by [12], the prevalence of self-reported sensations of DM (dry mouth) vary between 0.9% and 64.8%. Xerostomia has various causes, and this symptom is often associated with an unpleasant feeling and other symptoms in the mouth and throat [13]. Hence this study was performed to evaluate the effects of menopause on salivary flow rate and dryness.

DESIGN :

The protocol was approved by the ethics committee of University and all participants gave informed consent before participation in the study.

A cross-sectional study design was undertaken with a sample size of 60 subjects from whom stimulated whole salivary samples were collected to record salivary flow rate. Salivary pH weremeasured electrometrically. Oral sign of dryness was recorded respectively. Sixty subjects are divided equally into two groups:-

GROUP A The control group included 30 regularly menstruating healthy women (premenopausal women) (age range: 25-40 years).

GROUP B The study group included 30 post menopausal women (age range: 45-55years).

CRITERIA:

Women with normal chewing ability and who are not under hormonal replacement therapy are included. In study Women without the history of early menopause are included in specific. Patient under systemic medication, who is already under treatment of xerostomia and other mucosal diseases and women consuming any forms of tobacco and any other history of adverse habits are excluded from the study.This study aimed to determine the evidence of salivary dryness among premenopausal and post-menopausal women with the estimation of salivary flow rate and PH with the complaints of oral dryness.

SALIVA COLLECTION

ParaffinStimulated whole-salivary samples were collected in a quiet room between 9 AM and 12 PM, and at least 2 hours after the last intake of food or drink. Salivary samples of the control group were collected within the first three days of menstruation Stimulated salivary samples were obtained by allowing the Participants to chew a piece of paraffin of standardized size. The flow rate was measured as ml/min.Stimulated whole-saliva samples were collected into a preweighed and dry plastic tube. By subtracting the empty tube weight from the saliva-filled one, saliva sample weight was determined to calculate the salivary flow rate. The flow rate was calculated in grams per minute, which is almost equivalent to milliliters per minute[14]. Stimulated saliva flow rates in healthy individuals have found the

average value for whole saliva to be about 1.0 - 3.0 ml/min.Stimulated whole saliva flow rates of < 0.7 Ml/min Is indicated as salivary hypo function .

ASSESSMENT OF THE PH

After assessing the consistency the pH of the saliva was determined by dipping the pH test strip provided in the kit in to the sample of resting saliva collected for 10 seconds and then the color of the strip was checked with the testing chart provided with the saliva check kit. Accordingly the pH of the saliva was determined and given highly acidic, moderately acidic or healthy saliva comparing with the chart and the color of test strip, if intermediate color was seen in the strip then a higher value was assigned

Table 1. The xerostomia inventory (XI)[15]

I sip liquids to help swallow food.
My mouth feels dry when eating a meal.
I get up at night to drink.
My mouth feels dry.
I have difficulty in eating dry foods.
I suck sweets or cough lozenges to relieve dry mouth.
I have difficulty swallowing certain foods.
The skin of my face feels dry.
My eyes feel dry.
My lips feel dry. The inside of my nose feels dry.

Response options: never (scoring 1), hardly (2), occasionally

TABLE II: Comparison of Salivary flow between two groups

SALIVARY FLOW RATE	Group I		Group II	
	NO	%	NO	%
4ml	0	0.0	13	65%
5ml	0	0.0	7	35%
>5ml	20	100.0	0	0.0
Total	20	100.0	20	100%
Inference	Incidence of Salivary flow >5.0 ml significantly associated with Group I while <5 ml is significantly associated with Group II with p<0.001**			

TABLE III: Comparison of Salivary PH between two groups

SALIVARY pH	Group I		Group II	
	NO	%	NO	%
<7.0	4	20%	20	100%
7.0	9	45%	0	0
>7.0	7	35%	0	0
Total	20	100.0	20	100%
Inference	Incidence of Salivary pH <7.O Is predominant significantly in Group II than group I with p<0.0001**			

From the obtained clinical Questionnaire, the data collected has high statistical significant of ($p \leq 0.0001$) with incidence of salivary hyposalivation among post menopausalwomen than pre menopausal women. Spearman correlation was performed to see if any relationship existed between severity of OD feeling (XI score) and salivary flow rate . There was significant positive correlation between XI score and saliva flow rate ($r = 0.468$, $p = 0.039$).

DISCUSSIONS

Different phases of a woman's life: Puberty, menses, pregnancy, and menopause have varied influence on her oral health. During the menopause, women go through biological and endocrine changes, particularly in their sex steroid hormone production, affecting their health. Because the oral mucosa contains estrogen receptors, variations in hormone levels directly affect the oral cavity. A few oral conditions and or diseases are seen more frequently during post menopausal years[16].Estrogen can affect oral mucosa directly or through neural mechanism thus altering the periodontal health in menopausal women[17]. The oral problems may include a paucity of saliva leading to xerostomia, burning mouth syndrome, increase in incidence of dental caries, dysesthesia, taste alterations, atrophic gingivitis, periodontitis, and osteoporotic jaws[18].

Saliva acts as a defense mechanism for prevention of caries and reduced salivary flow can encourage oral microbial colonization thus affecting the dental health[19]. Salivary glands contain sex hormone receptors and these hormones have been estimated in the saliva[20].

In the present study, the salivary flow rate, pH, were evaluated in pre-menopausal, post-menopausal and also comparing the clinical correlation of xerostomia with the flow rate.As saliva is essential for the maintenance of oral health and the number of women receiving HRT is increasing, we excluded the patients under hormonal replacement therapy.

Studies have shown the average age of women attaining menopause being 50 years though it also states that women may attain early menopause in certain conditions where the women are thin in stature and women who smoke attain early menopause than their counter parts, also racial and geographic variations are seen.Hence women who are under smoking habit and also women who revealed history of early menopause are excluded from our present study. In our study we came across women who had attained menopause in the range of 45-52 years.

Minicucci et al. studied salivary flow rates in menopause and compared them with those of

premenopausal women. Salivary flow was evaluated by a chemical absorption stimulation test. Each subject provided three saliva samples: S1, nonstimulated saliva; S2, saliva initially stimulated with two drops of citric acid 2.5%; and S3, saliva super stimulated with two drops of citric acid 2.5% every 30 s for 2 min. Salivary flow was lower in menopausal group only in S2 and S3. Reduction in salivary flow rate can be responsible for xerostomia.[21]

During the study we also observed that few individuals also had complaints of oral burning sensation, halitosis, and some with complaints of decreased taste acuity which has been also discussed in the study done by studies [21,23,24].

In our study it was also observed that salivary pH of the postmenopausal group is statistically significantly lower than that of the control group. However, the study done by Yalçin[25]disagrees with the findings, which was performed using unstimulated saliva. Studies have demonstrated alterations in various salivary components, such as mucin, IgA, phosphates, alterations in salivary pH and electrical resistance have also been reported [25]. Our study showed significant reduction of salivary pH among post menopausal women. The changes may result from hormonal alterations taking place in menopausal women, altered sympathetic output related to stress, or from alterations in interactions between the cranial nerves serving taste and pain sensation [26].

Women with dry mouth usually are referred to dental personnel. In recent years, dental personnel have made significant contributions to the diagnosis and management of medical disorders. In future years, they will probably be included in the management of various systemic diseases. Because many women visit a dental office more often than a medical office [27].

CONCLUSION

It has been observed that life expectancy of women has increased significantly during the last decade, and most women spend one third of their lives after menopause. Our result suggests that there is a marked decrease in the salivary pH and flow rate in postmenopausal women which in turn leads to many

increased oral complaints of which oral dryness is the commonest finding.

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REFERENCE

1. Gold EB, Bromberger J, Crawford S, Samuels S, Greendale GA, Harlow SD, Skurnick J. Factors associated with age at natural menopause in a multiethnic sample of midlife women. Am J Epidemiol 2001;153:865-874.
2. Morabia A, Costanza MC. International variability in ages at menarche, first lifebirth, and menopause. World Health Organization Collaborative Study of Neoplasia and streroid Contraceptives. Am J Epidemiol 1998;148:1195-1205.
3. Nelson HD. Menopause. Lancet 2008;371:760-770.
4. Rutanen EM, Ylikorkala O. Vaihdevuosienhormonihoito. Kapseli 33. LääkelaitoksenjaKelanjulkaisuja. 2. painos, Joensuu 2004.
5. Kase NG. Impact of hormone therapy for women aged 35 to 65 years, from contraception to hormone replacement. Gend Med 2009;6:37-59.
6. World Health Organization. (WHO). Oral health surveys, 5th edn. Geneva. 1997.
7. Speroff L, Fritz M. Menopause and the perimenopausal transition. Clinical Gynecology Endocrinology and Infertility. 7th ed. Philadelphia, Pa:Lippinicott Williams and Wilkins. 2005:621688.
8. World Health Organization. WHO. Policy bases. 2010;
9. Hemalatha VT et al., Oral and Systemic Health during Menopause - A Systematic Review. Research Journal of Pharmaceutical, Biological and Chemical Sciences; September - October 2014 ,5(5) Page No. 792
10. Visvanathan V, Nix P. Int J ClinPract 2010;64:404-407.
11. Eveson J. Xerostomia. Periodontol 2000 2008;48:85-91.
12. Orellana MF, Lagravère MO, Boychuk DG, Major PW, Flores-Mir C. J Public Health Dent 2006;66:152158.
13. Torgerson RR. DermatolTher 2010;23:291-298.
14. Agha-Hosseini F, Mirzaii-Dizgah I, Moghaddam PP, Akrad ZT. Stimulated whole salivary flow rate and composition in menopausal women with oral dryness feeling. Oral Dis 2007;13:320-323.
15. Agha-Hosseini F, Mirzaii-Dizgah I, Mansourian A, Khayamzadeh M. Relationship of stimulated saliva 17A-estradiol and oral dryness feeling in menopause. Maturitas 2009;62:197-199.
16. VanitaSuri, VarunSuriMenopause and oral health,journal of mid-life healthjuly-sept 2014,vol 5,issue:3
17. Cao M, Shu L, Li J, Su J, Zhang W, Wang Q, *et al*. Theexpression of estrogen receptors and the effects of estrogenon human periodontal ligament cells. Methods Find ExpClinPharmacol 2007;29:329-35.
18. Friedlander AH. The physiology, medical managementand oral implications of menopause. J Am Dent Assoc2002;133:73-81.
19. Guggenheimer J, Moore PA. Xerostomia: Etiology, recognitionand treatment. J Am Dent Assoc 2003;134:61-9.
20. Tivis LJ, Richardson MD, Peddi E, Arjmandi B. Saliva versusserum estradiol: Implications for research studies using postmenopausal women. ProgNeuropsychopharmacolBiolPsychiatry 2005;29:727-32.
21. Minicucci EM, Pires RB, Vieira RA, Miot HA, Sposto MR. Assessing the impact of menopause on salivary flow and xerostomia. Aust Dent J 2013;58:230-4.
22. Barnabei VM, Grady D, Stovall DW, Cauley JA, Lin F, Stuenkel CA, et al. Menopausal symptoms in older women and the effects of treatment with hormone therapy. Obstet Gynecol. 2002; 100(6): 1209-18
23. Cutson TM, Meuleman E. Managing menopause. Am Fam Physician. 2000; 61: 1391-400.
24. Correlation between oral health and general health, Posted by: DrKam on: August 11, 2009.
25. Yalcin F, Gurgan S, Gurgan T. J .The effect of menopause ,hormone replacement therapy (HRT), alendronate (ALN), and calcium supplements on saliva. Contemp Dent Pract. 2005; May 15;6(2):10-7.
26. Sukumaran Anil, Mohammed Nasser Alsqah, R. Rajendran. Burning Mouth Syndrome: Diagnostic appraisal and management strategies. Burning Mouth Syndrome Research 2007;19;128-138.
27. McGehee JW Jr, Johnson RB. Biomarkers of bone turnover can be assayed from human saliva. J Gerontol A BiolSci Med Sci 2004;59: 196-200.

Review on Type-2 Fuzzy in Biomedicine

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ABSTRACT

Application of physiological and biological ethics to clinical practice is called medical science or Bio-medicine. This branch includes biochemistry, molecular biology, biological engineering neuro science, immunology, pathology and other life science applied to medicine. In this paper, a review has been done for creating a new path and motivation in this field for the new researchers as an application of fuzzy logic in life science areas. Since medical field has uncertainty in nature this topic will be very useful for the future research.

Keywords : *Type-2 Fuzzy, Biological Systems, Biomedicine, Image Processing, Chemical Engineering, Fuzzy Logic Controller*

INTRODUCTION

Biological systems are generally too complicated as they are so complex since developing automated systems are not truthful effort always. An explicit model for biological systems may not prevail or may be very difficult to design. Since human minds perform from rough data, condensed relevant information and carrying out crisp solutions, fuzzy logic may be considered as an optimal tool[1]. Logic and mechanism of Fuzzy logic approach does not have unperturbed boundaries such as human logic and it is not like sure or binary logic. Fuzzy logic control system is one of the most common application with this concept. This system do not demand complete knowledge based model like PID control system. With the knowledge of medical experts and their experience with the imprecise data Fuzzy systems can be designed[2,3].

This model has been used for an automatic control of drug delivery in surgical environment. There is a difficulty of identifying abdominal organs in anticipating the structure of the organ in clinical training, teaching, diagnosis and retrieval of medical image. Fuzzy logic inference system can conquer these problems with the use of automatic identification from a set of slices of CT image. A precise central segmentation may be useful in analyzing microscope images for detecting pathology. This can be done with the use of semi-supervised training fuzzy logic engine[4, 5, 6].

Adaptive nonlinear predictive control can be used to control glucose concentration during fasting subject to type-1 diabetes. Where the controller employs a section model which represents the gluco supervisory system and cover sub models to represent digestion of vaccines and medication regulated short-coming insulin Lispro and interior absorption with the use of Bayesian parameter calculation for determining time varying parameter changes[7].

Diagnosis of disease associates various levels of imprecision and uncertainty which is essential to medicine. In general precise description of disease individuals uses linguistic terms which is also imprecise and vague and hence fuzzy logic can be used for an optimal result. Segmentation of medical image is a complicated and challenging task due to inherent nature of images. For example brain has a specific complex structure and its exact segmentation is very crucial for identifying edema, tumors and dangerous tissues for applying proper therapy. For the early detection of unusual changes in organs and tissues can be diagnosed by the diagnostic image technique called Magnetic

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Resonance Imaging (MRI)[8,9].

Control algorithm combines the expert's knowledge about the treatment of any disease can be treated by using Mamdani-Type fuzzy logic controllers to control the blood glucose level. Fuzzy logic is used to handle uncertainties using natural language and hence it is an approach of qualitative computation. Since impreciseness exists in the field of medicine and huge data in bioinformatics, fuzzy logic is recommended to handle the situation for getting a desired solution. Bioinformatics is also a knowledge based computer analysis of biological data and contains the details stored in the genetic code and empirical results from different sources. Here also impreciseness will occur and hence fuzzy logic will be very useful[10, 11].

MR images have a good comparison resolution for various tissues and have an advantage of automatic tomography for brain studies. Thus majority of research concerns about MR images. Threshold determination is very difficult for brain images as the allocation of tissue intensities are complex and hence logic is used for brain segmentation[9-15, 23-30].

Even in chemical engineering fuzzy logic plays a vital role to handle the system uncertainties while the process of changing chemicals into valuable forms. In all the above cases the role of fuzzy logic has been explained. While getting more uncertainties in those mentioned cases, type-1 fuzzy cannot give the appropriate result as the consequences may have uncertainties[16-22, 31-33]. At this junction, Type-2 fuzzy logic can be used for its adaptivity and stability. In the following chapters, literature study and the role fuzzy in different field have been reviewed.

Fundamental Concepts

Role of Fuzzy Logic

In Medicine[1]

The difficulty of medical process makes conventional quantitative methods of analysis incorrect. Incomplete information, impreciseness and conflict nature are natural. In the field of medicine impreciseness can be classified by the following sources.

- Patient information
- Patient's medical history which is usually highly subjective and uncertain
- Uncertainty of the physical examination where the boundary between normal and pathological condition is uncertain
- Mistakes in the laboratory results due to patient's lack of support.
- Incomplete information given by the patient like understated/exaggerated

Fuzzy logic can be applied in the following experiments:

- To analyze the reaction to the treatment for alcohol dependence
- To evaluate diabetic neuropathy and early symptoms
- To measure the volume of the brain tissue
- To enhance decision making in radiation therapy
- To stabilize hypertension during unconscious stage due t anesthesia
- To diagnose breast cancer
- To estimate significant estimates of usage of drug
- Also fuzzy logic plays an essential role in clinical support systems.

In Bioinformatics[11]

Bioinformatics is an automatic analysis of biological data which includes the information saved in genetic code and results of the experiment from different sources, scientific literature and patient statistics. This branch incorporates computer science, principles of chemical and physical thing, biology, methodologies of modelling huge sets of biological data, cloning, training approach of bio-automatic systems etc. Molecular biology is presently employs project of uncertain data collection. DNA microarrays are the high methodologies with rapidly huge amount of data and it is difficult to apply traditional approaches whereas fuzzy logic deals this problem very easily as it handle multiple membership functions.

In Chemical Engineering[22]

This branch handles with the physical science and life science application such as biochemistry, biology

and micro biology. Naturally uncertainty occurs in the mentioned areas and obviously fuzzy logic can handle the impreciseness and can produce the desired result.

In Image processing[33]

In Image segmentation, Edge detection, feature extraction fuzzy logic plays a vital role whereas Type-2 fuzzy sets can deal with more uncertainties as there is a chance of having the inference may be uncertain.

Review on application of Fuzzy Logic in Bio Medicine

The authors, analyzed the usage of fuzzy logic control and auditing in medical sciences with the possible future diffusion[1]. Presented about fuzzy pharmacology with theoretical and applications aspect[2]. Proposed a combined method for automatic diagnosing abdominal organs from a sequence of CT image portions[3]. Used Bayesian parameter calculation to decide model parameters where there is a fluctuation in time[4].

Proposed a novel methodology for filtering framework called two-component adaptive vector filters which enables processing cDNA micro array images[5]. Have done a segmentation on cell nuclei using fuzzy logic engine with fuzzy rules under semi supervised training[6]. Used fuzzy c-means clustering for image segmentation as MR images always have noise due to performance of the operator, environment and equipment and analyzed the robustness of the proposed method[7]. Classified multi class cancer using fuzzy support vector machine and binary decision tree with the choice of gene[8].

Extracted generic feature using fuzzy c-means clustering[9]. Presented a general view of the applications of fuzzy logic in medicine and bioinformatics and presented geometrical perception of fuzzy sets in a fuzzy hypercube[10]. Presented a control algorithm subject to type-1 diabetes mellitus and this algorithm connect the expert's knowledge of the treatment for the disease[11]. Presented classification system using technique of pattern recognition with ARTMAP classifiers to produce a numerical vector representation of a sequence of protein and finding the nature of the sequence into number of given families. And they proved that the proposed system able to classify the protein sequence with an accuracy of 93%[12].

Applied interval type-2 fuzzy logic system to help radiologists to identify micro categorization in mammograms for Brest cancer[13]. Have done an electron tomographic data sets segmentation using the principles of fuzzy set theory[14]. Surveyed about the process of fuzzy expert systems in medical area such as the risk of coronary heart disease, prostate cancer, degree of child anemia, determining the level of anemia with iron deficiency, examination of periodontal dental disease, decision on drug dose etc which will helpful for the physicians[15].

Discussed physical fuzzy confidence curves for the natural unusual activity of falling and used modelling and monitoring human activity[16]. Presented a way of diagnosing thyroid cancer disease using fuzzy-neural networks[17]. Investigated more details on the application of fuzzy logic in chemical engineering[18]. Applied a system of telecardiology to help practitioner doctor when clinical data of patient suspect heart failures[19]. Developed a diagnostic alarm for clinical purpose based on fuzzy logic to detect diagnostic events when anesthesia is given[20].

Presented cost effective method for feature selection for diabetes diagnosis using genetic algorithms and fuzzy logic[21]. Used fuzzy entropy measure along with similarity classifier for feature selection[22]. Presented a novel approach by combined data mining and fuzzy logic for heart disease diagnosis[23]. Used weighted fuzzy rules to predict the risk level of heart disease as a clinical decision support system[24].

Used fuzzy c-means algorithm for image segmentation on MR Brain image[25]. Presented an automatic method based on fuzzy connectedness for extracting an object by segmenting jaw tissues and process of morphology for various views of pseudo orthopantomographic[26]. Discussed the importance of fuzzy logic in medical field. Presented the common idea for fuzzy logic publications with the applications in different fields of biology[28].

Detected breast cancer using fuzzy c means approach[29]. Have done a performance analysis of derived rule base multivariate type-2 self-organizing fuzzy logic controller employed to anesthesia[30]. Presented a work on automatic topic spotting in biomedical literature[31]. Generalized triangular fuzzy numbers are applied in medical decision making[32]. Interval Type-2 Fuzzy has

been Inference System and adaptive filter on raw tumor MRI edge detection[33].

CONCLUSION

Field of Biomedicine includes all the main areas like biological and life science as well. According to the review it is found that fuzzy logic plays an effective role in all the areas and there is not enough research on application of Type-2 Fuzzy in those areas. Hence it is concluded that this review process will give a motivation for the new researchers to do their research on Type-2 fuzzy in the mentioned areas.

Compliance with ethical Standards

Ethical approval

The article does not contain any studies with human participants or animal performed by any of the authors.

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REFERENCES

1. Mahafouf M, Fabbod M, ALinkens. A survey of fuzzy logic monitoring and control utilization in medicine, Artificial Intelligence in Medicine, 21(1-3), 27-42, 2001.
2. Sproule B A, Naranjo A A, Turksen I.B. Fuzzy pharmacology: theory and applications. Trends in Pharmacological Sciences, 23(9), 412-417, 2002.
3. Lee C C, Chung P C, Tsai H M. Identifying multiple abdominal organs from CT image series using a multi module contextual neural network and spatial fuzzy rules, IEEE Transaction on Information Technology in Biomedicine, 7(3), 208-217, 2003.
4. Hovorka R, Canonico V, Chassin L J, Haueter U, Benedetti M, Federici M O, Pieber T R, Schaller H C, Schaupp L, Vering T. Nonlinear model predictive control of glucose concentration, Institute of Physics and Engineering in Medicie, 25(4), 2004.
5. Lukac R, Plataniotis K N, Smolka B, Venetsanopoulos A N. cDNA microarray image processing using fuzzy vector filtering framework, Fuzzy Sets and Systems, 125(2005), 17-35, 2005.
6. Begelrnan G, Gur E, Rivlin E, Rudzsky M, Zalevsky Z. Cell nuclei segmentation using fuzzy logic engine, proceedings on International Conference on Image processing, 5, 2937-2940, 2005.
7. Shen S, Sandham W. MRI Fuzzy Segemntation of Brain Tissue Using Neighborhood Attraction With Neural-Network Optimization, IEEE Transactions on Information Technology in Biomedicine, 9(3), 459-467, 2005.
8. Mao Y, Zhou X, Pi D, Sun Y, Wong A T C. Multi class Cancer Classification by Using Fuzzy Support Vector Machine and Binary Decision Tree With Gene Selection, Journal of Biomedicine and Biotechnology, 2(2005), 160-171, 2005.
9. Srinivasa K G, Venugopal K R, Patnaik L N. Feature Extraction using Fuzzy C-Means Clustering for Data Mining Systems, International Journal of Computer Science and Network Security, 6(3A), 230-236, 2006.
10. Torres A, Nieto J J. Fuzzy logic in Medicine and Bioinformatics, Journal of Biomedicine and Biotechnology, 2006, 1-7, 2006.
11. Delgado D U C, Ordonez M H, Femat R, Mosco A G. Fuzzy-Based Controller for Glucose Regulation in Type-1 Diabetic Patients by Subcutaneous Route, IEEE Transactions on Biomedical Engineering, 53(11), 2201-2210, 2006.
12. Mohamed S, Rubin D, Marwala T. Multi-class Protein Sequence Classification Using Fuzzy ARTMAP, IEEE Transactions on Systems, Man and Cybernetics, 2006.
13. Thoyutikul S, Auephanwiriyakul S, Umpon N T. Microcalcification Detection in Mammograms Using Interval Type-2 Fuzzy Logic System, IEEE International Fuzzy Systems conference, 2007.
14. Garduno E, Barnum M W, Volkmann N, Ellisman M H. Segmentation of electron tomographic data sets using fuzzy set theory principles, Journal of Structural Biology, 162(3), 368-379, 2008.
15. Allahverdi N. Design of Fuzzy Expert Systems and Its Applications in Some Medical Areas, International Journal of Applied Mathematics, Electronics and Computers, 2(1), 1-8,2014.
16. Anderson D, Luke R H, Keller J M, Skubic M, Rantz M J, Aud M A. Modelling Human Activity From Voxel Person Using Fuzzy Logic, 39-49, 2008.

17. Senol C, Yildirim T. Thyroid and breast cancer disease diagnosis using fuzzy-neural networks, International Conference on Electrical and Electronics Engineering, 2009.
18. Emami M S R. Fuzzy Logic Applications in Chemical processes, The Journal of Mathematics and Computer Science, 1(4), 339-348, 2010.
19. Ceylan R, Ozbay Y, Karlik B. Telecardiology and Treatment System Design for Heart Failures Uisng Type-2 Fuzzy Clustering Neural Networks, International Journal of Artificial Intelligence and Expert Systems, 1(4), 100-110, 2011.
20. Baig M M, Hosseini H G, Kouzani A, Harrison M J. Anaesthesia monitoring using fuzzy logic, Jurnal of Clinical Monitoring and Computing, 25(339), 2011.
21. Ephzibah E P. Cost effective approach on feature selection using genetic algorithms and fuzzy logic for diabetes diagnosis, Neural and Evolutionary Computing, 2011.
22. Luukka P. Feature selection using fuzzy entropy measures with similarity classifier, Expert Systems with Applications, 38(2011), 4600-4607, 2011.
23. Bhatla N, Jyoti K. A Novel Approach for Heart Disease Diagnosis using Data Mining and Fuzzy Logic, International Journal of Computer Applications, 54(17), 16-21, 2012.
24. Anooj P K. Clinical decision support system: Risk level prediction of heart disease using weighted fuzzy rules, Journal of King Saud University - Computer and Information Sciences, 24, 27-40, 2012.
25. Rakesh M, Ravi T. Image Segmentation and Detection of Tumor Objects in MR Brain Images Using FUZZY C-MEANS Algorithm, International Journal of Engineering Research and Applications, 2(3), 2088-2094, 2012.
26. Llorens R, Narano V, Lopez F, Alcaniz M. Jaw tissues segmentation in dental 3D CT images using fuzzy-connectedness and morphological processing, Computer Methods and Programs in Biomedicine, 108(2), 832-843, 2012.
27. Prasath V, Lakshmi N, Nathiya M, Bharathan N, Neetha N P. A Survey on the Applications of Fuzzy Logic in Medical Diagnosis, International Journal of Scientific &Engineering Research, 4(4), 1199-1203, 2013.
28. Patel A, Gupta S K, Rehman Q, Verma M K. Application of Fuzzy Logic in Biomedical Informatics, Journal of Emerging Trends in Computing and Information Sciences, 4(1), 57-62, 2013.
29. Tintu P B, Paulin R. Detect Breast Cancer using Fuzzy C means Techniques in Wisconsin Prognostic Breast Cancer Data Sets, International Journal of Computer Applications Technology and Research, 2(5), 614-617, 2013.
30. Liu Y X, Doctor F, Fan S Z, Shieh J S. Performance Analysis of Extracted Rule-Base Multivariable Type-2 Self- Organizing Fuzzy Logic Controller Applied to Anesthesis, 2014,1-19, 2014.
31. Ayyaz S, Qamar U. Automatic Topic Spotting in Biomedical Literature of diseases using Fuzzy Logic, proceedings of the 2nd International Conference on Computer and Information Science and Technology, 2016.
32. Dutta P, Dash S R. Medical Decision Making via the Arithmetic of Generalized Triangular Fuzzy Numbers, ISSN:1874-110X, 12, 2018.
33. Hasan S, Jumaa S S. Raw Tumor MRI Edge Detection using Interval Type-2 Fuzzy Inference System and Adaptive Filter, Journal of Fundamental and Applied Sciences, 10(5S), 201-206. 2018.

Segmentation of Mammography Calcifications Using Fusion of Fuzzy C-Means and K-Means Algorithm

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ABSTRACT

Breast cancer is the most life-threatening disease among women. The best way to decrease the mortality is early detection of cancer from digital mammogram. The diagnosis can be successful if the pre-processing and segmentation of the digital mammograms identifies the suspicious area correctly. In this paper, the Butterworth bandpass filter along with fusion of FCM and K-means clustering followed by morphological operations is used for the segmentation of calcification areas from the mammogram images.

Keywords: *Breast cancer, diagnosis, digital mammogram, pre-processing, Butterworth bandpass filter, segmentation, fusion, FCM, K-means, Cluster, morphology.*

INTRODUCTION

The deadliest diseases that threatens human life in modern days is Cancer. Breast cancer is the leading disease in women which increases the mortality rate [1]. The early detection of breast cancer is the only solution to decrease mortality rate. The screening of breast cancer is done by digital mammogram which aids early detection. Researchers have developed many Computer Aided Detection and Diagnosis methods for detecting the cancer in digital mammographic images [2]. In general, the CAD systems consists of the following steps: pre-processing, segmentation, feature extraction, feature selection and classification. The classification process classifies the given mammographic image as cancerous and non-cancerous. The quality and performance of the CAD system depends on the initial steps that includes pre-processing and segmentation.

The pre-processing is done on the raw image in order to remove the unwanted details that are present in the mammographic image [3]. There are several types of pre-processing filters available which can be categorized into spatial domain and frequency domain filters.

The pre-processed image is given as input for the segmentation process. Segmentation is the process of dividing the image on the basis of grey levels. Segmentations can be achieved using many techniques like thresholding, region-based, edge detection, and hybrid techniques [4]. Clustering is a region-based segmentation and unsupervised learning technique. Clusters divides the image into groups wherein the members of the same cluster are similar in some manner and shows difference among the members of other clusters. Clustering is an unsupervised segmentation which groups the image based on the grey level value of the image pixels. This method provides meaningful insight over the grey level distribution in image which helps in classifying different features. The Clustering can be broadly classified as soft clustering and hard clustering. This paper uses the fusion of FCM, a soft clustering method and the K-means, a hard clustering and the output image is subjected to iterative morphological operations like erosion and dilation manually to obtain the segmented feature.

LITERATURE SURVEY

Nayan et. al [5] have applied mean, adaptive median and wiener filtering techniques on the mammographic images and proved using mean square error (MSE) and peak to signal noise ratio (PSNR) that the adaptive median filter is best in reducing noise. Further to segment calcification [6] Butterworth bandpass filter in Fourier domain with the frequency band between 2.891 mm^{-1} to 0.391 mm^{-1} was used. The Butterworth band pass filter was used as an edge detection technique and they proved

to be working well in comparison to other standard edge detection techniques. Jabbari H et.al. [7] has proposed a hybrid algorithm using wavelet algorithm, genetic algorithm and mathematical morphological operations for segmentation of mammographic images. They compared with the existing optimization ant colony and particle swarm optimization and proved that there proposed algorithm gives a classification accuracy of 91.4% and hence better than the other algorithms.

Four methods, gray level stretching and morphological operations, K-means clustering based on intensity and position, FCM and FCM cluster centre passed to K-means clustering based on FCM cluster was compared [8]. They compared the area of tumour and have suggested for further work for improving segmentation using supervised classification methods. In another technique [9] authors have used the centroids obtained from subtractive cluster as initial cluster to K-means algorithm. Before subjecting to K-means algorithm they have increased the quality of image using partial contrast stretching. The output of K-means is fed to median filter for removing the unwanted region and for achieving better segmentation. RSME and PSNR were used to compare classical K-means and there proposed model, and found that there proposed model showed better performance. Also, they have suggested for using the morphological operations for improving the segmentation and also performance.

Nalini Singh et al [10] has proposed a novel approach for segmentation by combining the K-means clustering and FCM clustering. Theoretically authors [11] tried using principal component analysis (PCA) for initial clustering. The resulting clustering was next fed to K-means for segmentation. Wiener filter was used to remove the noise and then subjected to pillar algorithm for initial centroids optimization [12]. After applying wiener filter, it was subjected to color transformation using hybrid color systems CIELAB AND HSL and then it was subjected to data normalization using softmax algorithm followed by segmentation using pillar algorithm. The pillar algorithm was used to optimize the K-means clustering to increase the precision and decrease time for segmentation. This Pillar-Kmeans was compared with conventional K-means and Gausian Mixture Model and proved to give better results in terms of precision.

Sadhana Tiwari et. al[13] has proposed optimized K-means clustering in which they have saved the distance and the cluster label of each pixel which reduces the time complexity by not calculating the distance for the pixels every time. It hence reduces the time complexity of the standard K-means clustering technique. S. M. Aqil Burney et. al. [14] has discussed the various performance evaluation measures that are used for evaluating the results of the K-means cluster analysis. The Silhoutte curve is used as one metric which provides an insight of the tightness and separation within and among clusters. The value above 0.71 proves to do best clusters. The Confusion matrix is the other metrics which provides a 2x2 matrix from the actual (TP and TN) and the predicted (TP and TN). From this matrix the accuracy, precision, sensitivity and specificity are calculated. The Precision to Recall graph is drawn in which the performance is considered high if the classifier falls in top left and poor if it is in bottom right.

In the automatic detection of lesions in breast image segmentation algorithm was proposed in which the image is subjected to adaptive median filter followed by adaptive thresholding using local and global thresholding and then continued by the morphological operations of opening and closing to obtain the segmented image [15]. This proposed method is compared with the manual ROI done by experts and was proved to give better results using dice coefficient, Jaccard coefficient, Hausdorff distance, accuracy, sensitivity and specificity. FCM and K-means clustering for segmentation of mammographic images in terms of Contrast, Energy, Homogeneity, Correlation were compared and also they bring out the strengths and weaknesses of the FCM and K-means clustering algorithms [16].

P.D.Yadav et al[17] has proposed an algorithm wherein the image is filtered using tracking algorithm to remove labels and unwanted area, erosion, dilation and median filter and then it undergoes segmentation using k-means clustering, followed by FCM and watershed algorithm followed by erosion and dilation morphological operations. J. Quintanilla-Dominguez et al [18] has used morphological operation using Top-Hat morphological transform and a proposed segmentation using K-means, FCM and possibilistic FCM based on the proposed threshold value and conclude that the segmentation results depend on the appropriate threshold value selection.

Rajeev Kumar et al [19] has used adaptive median filter on the image and an edge preservation technique

by adding 0 and 1 to the image pixel. Later the author used their proposed segmentation method by combining k-means followed by the morphological operations. This proposed method is compared with FCM, K-means, EM and K-means with FCM and proved to give better results in terms of TP, TN, FP, FN, Accuracy, Precision, Recall with less execution time.

METHODOLOGY

This paper describes the pre-processing of mammography image along with the segmentation of cancerous tissues. For pre-processing of mammography images various filters were used. If the mammogram is RGB image then it is converted to grey level image before subjecting it to processing. Histogram of the image is plotted to understand how the grey levels are distributed. It is used to understand the grey level of background, structural features and cancerous tissues. To enhance the required features and to suppress the unwanted details, the image is then subjected to Butterworth bandpass filter, a frequency domain filter. This filter was analysed with other filters and was observed that it yielded superior results [20].

The filtered image was next subjected to region-based segmentation technique. A fusion of Fuzzy C-Means clustering, and K-Means clustering is used to segment the calcified region. First the FCM algorithm is used to iterate maximum 100 times or till convergence occurs to produces 4 clusters. All the iterated images are displayed and best clustered image is selected manually and passed to the next stage of K-means clustering. K-Means clustering algorithm is iterated 10 times to produce 4 clusters. The clustered image which reflects the best segmentation is selected using the K-means energy (iteration at the elbow point is selected) to undergo the morphological operations dilation, erosion, opening and closing and to obtain the resultant segmented image. This image segments the calcified region only and serves as the input to calculate the area and other parameters required.

Fuzzy C-Means algorithm uses both fuzzy logic and fuzzy sets. In FCM, a data object belongs to two or more than one clusters. When a specified number of clusters are given, the FCM clusters groups the data elements based on distance measure from the centers. The data object is grouped to the nearest centers. Now the cluster center is recalculated for each cluster. Then these steps are repeated until the cluster centers remains unchanged. The objective function is given by

$$J_m = \sum_{i=1}^{N}\sum_{j=1}^{C} u_{ij}^{m} ||x_i - c_j||^2 \quad \text{---------- (1)}$$

Where m=any real number > 1 , u_{ij}=degree of membership of x_i in the cluster j, x_i= the ith of d-dimensional measured data, c_{ij}=d-dimension center of the cluster

The equation used for calculating the cluster centre in FCM is given below

$$c_j = \frac{\sum_{i=1}^{N} u_{ij}^{m}.x_i}{\sum_{i=1}^{N} u_{ij}^{m}} \quad \text{---------- (2)}$$

The membership function is updated using the following equation

$$u_{ij} = \frac{1}{\sum_{k=1}^{c}(\frac{||x_i - c_j||}{||x_j - c_k||})^{\frac{2}{m-1}}} \quad \text{---------- (3)}$$

The process end when,

$$max_{ij}\left|M_{ij}^{(k+1)} - M_{ij}^{(k)}\right| < \delta \quad \text{----------(4)}$$

Where δ =termination value or constant between1 & K=no to iteration steps

The k-means objective is to minimize the cluster members and cluster centroids. It first selects the number of clusters k and then it randomly generates clusters to determine the cluster centres. After this process it assigns each data point to the nearest cluster centre and then it recomputes the new cluster centres. These steps are iterated until the minimum variance criterion is achieved. To verify this k-energy minimization graph is plotted in the graph where x-axis represents iterations and y-axis represents the energy. This energy of the cluster k is calculated using the formula

E(k) = Sum (all X(I) in cluster k) || X(I) - Z(k) ||^2

The morphological operations are the operations performed on the image to extract its boundaries. These operations are applied on a binary image only. Dilation and Erosion are two operations which are applied iteratively. Erosion is applied twice followed by Dilation

in our process. The segmented image thus obtained identifies the calcified area correctly.

RESULTS AND DISCUSSIONS

Matlab was used to implement the proposed algorithm. In this paper we have considered 136 images obtained from a scan centre. From these four sample images (Fig.1) are shown below

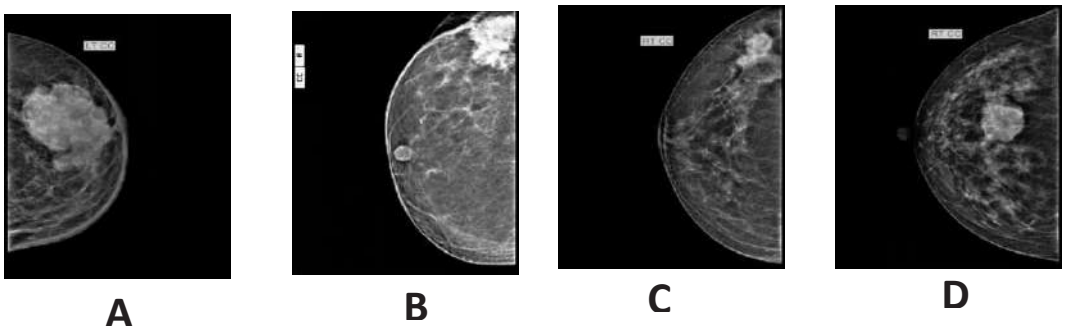
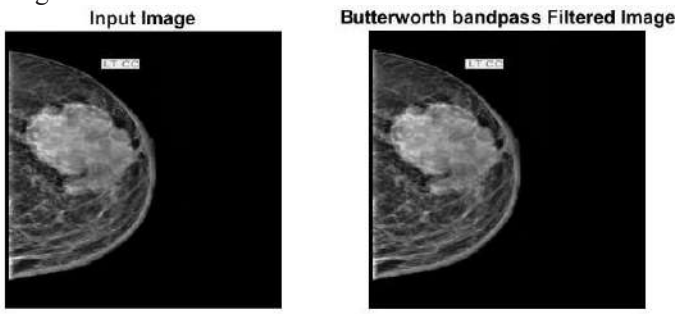


Fig 1. Real-time mammographic images (A), (B), (C), (D)

The size of the images taken for this study is 8584 x 4784. These image size couldn't be processed with the normal system. Henceforth the images are resized to 256 x 256 pixels for easy processing.

i. Image A

The Image A is considered and image comparison of raw image and Butterworth bandpass filtered image is brought out in Fig. 2.



(a) (b)

Fig 2. (a) Raw mammographic image (b)Butterworth bandpass filtered image

The filtered image is subjected to FCM and the output of the selected clustered image is brought out in Fig.3.

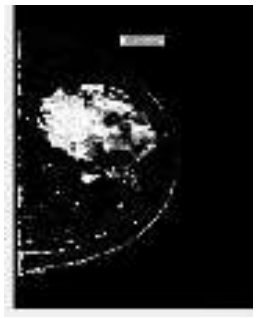
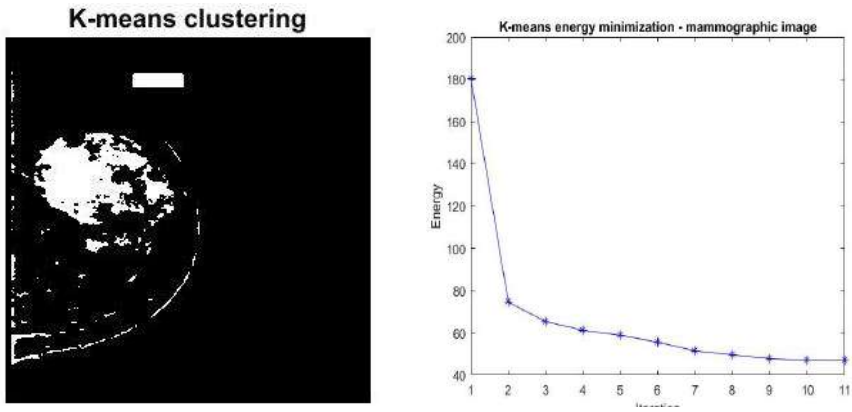


Fig 3. Selected FCM cluster image

The images are manually visualized for selecting the input to k-means algorithm. The selected clustered image is subjected to k-means and using k-means energy as shown in Fig**. 4**(b) the image obtained at the elbow point is selected for convergence and is shown in Fig**. 4**(a).



(a) (b)

Fig 4. (a)The K-means cluster output, (b) k-means energy graph

The resulting k-means clustered image is cropped to avoid unnecessary spaces and then subjected to iterated erosion and dilation morphological operations and the resultant segmented image is brought out in Fig5.

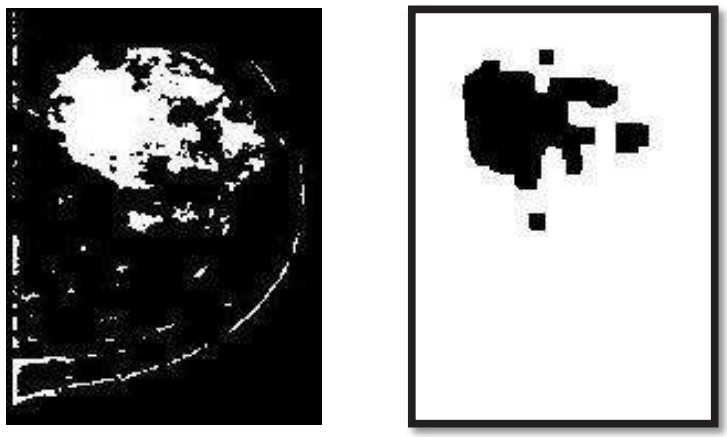


Fig 5. (a) The cropped k-means cluster image (b)Output image after morphological operations

In similar manner the other three images were processed and their outputs are obtained to calculate the calcified area and is compared with the classical FCM and K-means algorithm. The results are tabulated in table1 given below. It can be observed that the segmented region in proposed algorithm isolates the calcified region and hence area computed reflects only this region and it is minimum in comparison to others

Table1. Area of segmented image using FCM segmentation, K-means Segmentation, Fusion Segmentation

IMAGE	FCM	KMEANS	FUSION ALGORITHM
A	1.18e+05	1.21e+05	2.42e+04
B	1.22e+05	1.29e+05	3.83e+04
C	1.20e+05	1.25e+05	3.35e+04
D	1.24e+05	1.28e+05	3.56e+04

CONCLUSION

The segmentation and the pre-processing are the important phases in the detection and diagnosis of breast cancer from the mammographic images. In this paper, a fusion algorithm for segmentation is proposed. The image is initially pre-processed with the Butterworth bandpass filter and is then segmented using the fusion

algorithm based on FCM, K-means clustering and morphological operations. The area of the segmented image is calculated and is compared with the standard FCM, K-means algorithm and is evident that the fusion algorithm followed by morphological operations identifies calcification areas as diagnosed by the medical practitioner.

Conflict of Interest – Nil

Source of Funding – Self

Ethical Clearance – Taken from the Saravana Scans and Labs who provided us the mammographic images required for the study.

REFERENCES

1. National Institute of Cancer Prevention and Research, GLOBOCAN Statistics, Chapter 10, 2012.
2. Nafiza Saidin, Harsa Amylia Mat Sakim, Umi Kalthum Ngah, Ibrahim Lutfi Shuaib. Computer Aided Detection of Breast Density and Mass, and Visualization of Other Breast Anatomical Regions on Mammograms Using Graph Cuts. Computational and Mathematical Methods in Medicine 2013. http://dx.doi.org/10.1155/2013/205384.
3. Wenda He, Peter Hogg, Arne Juette, Erika R. E. Denton, Reyer Zwiggelaar. Breast image pre-processing for mammographic tissue segmentation. Computers in Biology and Medicine 2015;(67) 61–73. https://www.ncbi.nlm.nih.gov/pubmed/26498046
4. Jelena Bozek, Mario Mustra, Kresimir Delac, and Mislav Grgic1.A Survey of Image Processing Algorithms in Digital Mammography. Rec. Advan. in Mult. Sig. Process. and Commun. SCI 231, 2009.
5. Ms.Nayan H.Gaikwad, Ms.Anjali P.Narwadkar, Ms.Ashwini S.Barge. Enhancement of mammogram for detection of breast cancer using adaptive median filter. International research journal of multidisciplinary studies & sppp's. March 2016;(2) 1-4.
6. Elizabeth López Meléndez and Gonzalo Urcid. Mammograms calcifications segmentation based on band-pass Fourier filtering and adaptive statistical thresholding. European International Journal of Science and Technology.2016.
7. Jabbari H, Bigdeli N, Iran Khadem A, Nooshin Bigdeli. A New Hybrid Method for Segmentation and Detection of the Tumors in the Mammographic Images of the Breast Tissue. Iranian Quarterly Journal of Breast Disease 2016; 9(3).
8. S.M. Ali, Loay Kadom Abood, and Rabab Saadoon Abdoon. Brain Tumor Extraction in MRI images using Clustering and Morphological Operations Techniques. International Journal of Geographical Information System Applications and Remote Sensing.2013(4).
9. Nameirakpam Dhanachandra, Khumanthem Manglem and Yambem Jina Chanu . Image Segmentation using K-means Clustering Algorithm and Subtractive Clustering Algorithm. Proceedings of 11th International Multi-Conference on Information Processing;2015;(54) 764 – 771.
10. Nalini Singh, Ambarish G Mohapatra, Gurukalyan Kanungo. Breast Cancer Mass Detection in Mammograms using K-means and Fuzzy C-means Clustering. International Journal of Computer Applications. May 2011;(22)2.
11. Chris Ding, Xiaofeng He. K-means Clustering via Principal Component Analysis. Proceedings of the 21st International Conference on Machine Learning, Ban□, Canada;2004.
12. Ali Ridho Barakbah and Yasushi Kiyoki. A New Approach for Image Segmentation using Pillar-Kmeans Algorithm. International Journal of Electronics and Communication Engineering 2009;(3)11.
13. Sadhana Tiwari, Tanu Solanki.An Optimized Approach for k-means Clustering. IJCA. 2013.
14. S. M. Aqil Burney , Humera Tariq. K-Means Cluster Analysis for Image Segmentation. IJCA June 2014;(96)4.
15. Muzni Sahar , Hanung Adi Nugroho ,Tianur , Igi Ardiyanto, Lina Choridah . Automated Detection of Breast Cancer Lesions Using Adaptive Thresholding and Morphological Operation. Proceedings of International Conference on Information Technology Systems and Innovation (ICITSI) ;Bali:Oct 24 – 27, 2016.
16. Snehali D. Sable. Implementation And Analysis Of K- Means And Fuzzy C Means Clustering Techniques. Proceedings of 26th IRF International Conference; Pune, India: 10th May 2015.

17. P.D.Yadav, Y.M.Patil. Brain Tumor Detection Using K-Means, Fuzzy C Means And Watershed Segmentation. Proceedings of International Conference in Engineering, Science and Humanities;Feb 2017.
18. J. Quintanilla-Dominguez, B. Ojeda-Magaña, M.G. Cortina-Januchs, R. Ruelas, A. Vega-Corona, D. Andina. Image segmentation by fuzzy and possibilistic clustering algorithms for the identification of microcalcifications. Scientia Iranica D 2011; 18 (3), 580–589.
19. Rajeev Kumar, Dr. K. James Mathai. Brain Tumor Segmentation by Modified Kmean with Morphological Operations. IJIRSET, August 2017;(6).
20. Ms.S.Poonguzhali, Ms.Ananthi sheshasaayee. Butterworth Bandpass Filtering of Mammographic images for detecting Breast Cancer. JARDCS, 2018;(11)1081-87.

Effects of Ambient $PM_{2.5}$ Exposure on Lung Function Disorder In Community Around Construction Industry

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ABSTRACT

Background : Previous studies have reported adverse effects of fine particulate on lung function. However, there has not been much research conducted in the construction industry area.

Objective : The study was to determine the relationship between exposure of ambient $PM_{2.5}$ concentrations to lung function disorders in the ready-mix industry area.

Material & Method : The research used a cross-sectional study on sample size of 100 respondents. It was divided into two regions which were determined based on the dominant wind direction. Ambient $PM_{2.5}$ concentration was measured using gravimetric method, and pulmonary function used a portable spirometry.

Results : $PM_{2.5}$ concentration was obtained above the average of NAAQS provision (0.041 mg/m^3). There was no significant association between lung function disorder and the average $PM_{2.5}$ concentration both site A (p=0.583) and B (p=0.321), but from smoking behavior, there was a significant association with lung function disorder. This study found no evidence to suggest that living in the area of ready-mix industry is a major determinant of lung function disorder. Further research is needed to see early indications of health effect using other chemical methods and parameters.

Keywords: *$PM_{2.5}$, lung, particulate matter, ready-mix*

INTRODUCTION

Air pollution is one of the global problems that occur in almost all countries in the world and tends to increase every year. WHO said around 92% of the world's population live in places with air quality levels that exceed the safe threshold [1]. Air pollution is a major environmental risk factor affecting human health in both developed and developing countries [2]. Exposure to air pollutants may cause various health effects depending on the composition of contaminants (various particles and gases), exposure levels, duration, and frequency of exposure, as well as the associated toxicity of specific pollutants [3]. Urban ambient air pollution is a complex mixture of gases and particles. Although several gases are irritants, it is widely assumed that particles play the crucial role in cardio-respiratory health effects of air pollution [4].

The construction industry is still considered an important source of atmospheric pollution due to particulate matter emissions, causing negative impacts on human health and the environment [5]. Besides that, it has been investigated the adverse effect of traffic-road-related particulate matter (PM) on human health [6]. Particulate matter less than 2.5 μm in diameter ($PM_{2.5}$) is an important concern because the particulate can freely enter the respiratory tract and settle in the alveoli.

Worldwide, it is estimated that air pollution caused by $PM_{2.5}$ in the atmosphere is responsible for approximately 0.8 million premature deaths and 6.4 million years of life lost annually [7]. Another research in Cement industry, Padang City, Indonesia found that $PM_{2.5}$ exposure showed that less than 2.5 km of location

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at risk to society [8]. The exposure of PM_{10} in ready-mix industry area of PT. X Plant Kebon Nanas posed a risk to the industrial workers [9]. Lung function is a noninvasive measure of pulmonary health and has been frequently used in previous studies to asses the health effects of air pollution [4].

According to Basic Health Research (RISKESDAS) 2013, it was found that the prevalence of upper respiratory tract infections (URI) cases in Indonesia was 25% [10]. URI and other respiratory tract disorders are caused by low biological, physical and chemical of home air quality both inside and outside. Based on Jagaraksa health center data period 2015-2016 states that cases of upper respiratory tract infections (URI) always occupy the top position compared to other cases (Puskesmas Jagaraksa, 2018). In this region, there is a ready-mix concrete industry that is large enough and adjacent to the residential population. The detrimental health impacts of PM emissions are not confined to the construction site, since fine particles (particulate matter smaller than 2.5 μm in diameter) can travel further than coarser dust (particulate matter between 2.5 μm and 10 μm in diameter), therefore it could affect the health of people living and work in the surrounding area [5]. High URI cases in Jagaraksa sub-district, one of which is suspected due to the contribution of $PM_{2.5}$ exposure from ready-mix industry activities in Lenteng Agung area, South Jakarta. But not many studies that assess the risk of respiratory disorders in communities around the industry. Our study objective was to analyze the effect of $PM_{2.5}$ exposure on lung function disorder in the community living in areas of the construction industry in Lenteng Agung, South Jakarta.

METHODS

Design and study participant

This study was an analytic observation with a cross-sectional design. It was conducted on 100 people who take daily activity around ready-mix industrial area, Lenteng Agung, South Jakarta in April - June 2018. The study participants were randomly selected, more than 17 years of age, having good health condition. We excluded people who have the history of respiratory disorder such as asthma and bronchitis. Anthropometry measurement, smoking status, family history of smoking, kitchen ventilation, and environmental tobacco smoking exposure were collected.

Ambient $PM_{2.5}$ Concentration Measurement

$PM_{2.5}$ concentration was measured using High Volume Air Sampler (HVAS) by gravimetric method [11] at 10 points in 1 hour at each observation point in the study area. Distribution of air sampling test results was grouped into location A and B. Location A was taken based on dominant wind direction from the data from the Climatology and Geophysics Meteorology Agency (BMKG) in May - June 2018, which comprised 4 points (point 1 to 4). Location B consisted of the points (point 5 to 10) which locations closest to the source of pollutants and the traffic road.

Pulmonary function test

Pulmonary function test was carried out in the participant's residence by using calibrated portable spirometry. Spirometry was used to measure the forced expiratory volume in 1 second (FEV_1), forced vital capacity (FVC), and FEV_1/FVC ratio. The respondent's body weight and height were measured using standard digital body scales and microtoise. Spirometry results were processed manually using the numerical data contained in the table of normal pulmonary values according to age and height of Indonesian [12], after the calculation it would result in the presentation of FEV_1 and FVC. Furthermore, the researcher categorized the final results where the ratio percentage of FEV_1/ FVC ≤ 70% was included as a pulmonary disorder.

Data analysis

The data was processed and presented through a descriptive analysis, and chi-square test to identify the relationship between the dependent and independent variable. The relationship was considered as significant if the p-value was < 0.05.

RESULTS

Based on the monitoring of $PM_{2.5}$ air quality test over 10 points, the highest concentration of 0.091 mg/m^3 located at point 1, the value with the lowest concentration was point 3, which was 0.032 mg/m^3 (Table 1). Point 1 was the location closest to the ready-mix industry so that the highest $PM_{2.5}$ concentration was obtained compared to other measurement points. In addition, the area was the dominant wind direction from the data from the Climatology and Geophysics Meteorology Agency (BMKG).

Tabel 1. The concentration of ambient $PM_{2.5,}$ industrial area, Lenteng Agung, Jakarta

Air Sampling Site	PM 2.5 (mg/m3)	Distance to Industry (m)	Wind direction
Sample 1	0.091	200	Northwest
Sample 2	0.037	600	Northwest
Sample 3	0.032	1000	Northwest
Sample 4	0.037	1400	Northwest
Sample 5	0.040	200	North
Sample 6	0.046	400	North
Sample 7	0.064	200	East
Sample 8	0.037	400	East
Sample 9	0.048	200	South
Sample 10	0.043	400	South

The overall distribution of data used for the calculation of risk analysis of $PM_{2.5}$ concentration was the median value of 0.041 mg/m^3. A median value of 0.037 mg/m^3 was used to determined the level of concentration at location A and the average value of 0.0463 mg/m^3 at location B.Based on age, people under the age of 45 years were at risk of lung function disorder by 4.48 times higher than people aged over 45 years. Women had 5.84 times higher risk of lung function disorder than men. According to the smoking status, people who smoked were 4.14 times more likely to experience lung function disorder compared to non-smokers. The effects related to body weight, height, family members who smoke, environmental tobacco exposure, and kitchen ventilation were weak or absent (Table 2).

Tabel 2. Characteristic of all study participants with pulmonary function disorder

	N	Lung Function Disorder (N)	Prevalence (%)	P Value	OR
Age, year					
≤ 45	60	16	26.7	0.03*	4.48
> 45	40	3	7.5		
Body weight, kg					
> 60.11	25	4	16.0	0.88	0.76
≤ 60.11	75	15	20.0		
Height, cm					
≤ 158.42	55	12	21.8	0.59	1.52
>158.42	45	7	15.6		
Sex					
Female	65	17	26.2	0.03*	5.84
Male	35	2	5.7		
Smoking status					
Yes	17	7	41.2	0.03*	4.14
No	83	12	14.5		
Family members who smoke					
Yes	55	12	21.8	0.59	1.51
No	45	7	15.5		
Kitchen ventilation					
Yes	64	13	20.3	0.86	0.78
No	36	6	16.7		
Environmental tobacco smoking exposure					
Yes	65	13	20.0	0.94	1.2
No	35	6	17.1		

OR= Odds ratio, * P-value < 0.05

The association of $PM_{2.5}$ exposure with pulmonary function disorder showed that there was no relationship between ambient $PM_{2.5}$ exposure between site A and B ($p>0.05$).

Table 3. Association of $PM_{2.5}$ concentration with lung function disorder

Variable	Lung Function					P	
	Disorder		Normal		Total	Value	OR
	N	%	N	%			
Site A							
PM2.5 Concentration							
> 0.037 mg/m3	2	25.0	6	75.0	8	0.58	2.25
≤ 0.037 mg/m3	4	12.9	27	87.1	31		
Site B							
PM2.5 Concentration							
> 0.046 mg/m3	6	30	14	70	20	0.32	2.08
≤ 0.046 mg/m3	7	17.1	34	82.9	41		

DISCUSSION

The measurement of $PM_{2.5}$ concentration at 10 points in the study location resulted in various values. The observation point was getting closer to the ready-mix industrial location, so the concentration of $PM_{2.5}$ was getting higher. When compared to the value of Ambient Air Quality Standard Indonesia Government Regulation this value has not passed the standard quality of 0.065 mg/m^3, except point 1, but when we compared with National Ambient Air Quality Objectives Standard (NAAQOS), this value has exceeded the 0.035 mg/m^3 quality standard [13]. According to WHO guidelines, this value also exceeds the threshold of 0.025 mg/m^3 [14]. The location of point 1 was the highest $PM_{2.5}$ concentration compared to the others. It was because the location of the measurement point was quite sufficient with the ready-mix industry and it was dominant wind direction. This result was in line with research conducted in Nagasaki, Japan, which stated that meteorological conditions also influence the high concentration of $PM_{2.5}$ in the environment, including wind direction and humidity [15]. In addition to its location at a radius of 200 m with ready-mix industry, this point was also adjacent to the main road with busy traffic. Particulate matter from road traffic comes from vehicle emission, tire wear, break-wear and vehicle-induced resuspension of road dust [16].

Statistical analysis showed that age, sex, and smoking status were associated with the incidence of lung function disorder. Age, gender, body size, and ethnicity are strong predictors of lung function [4]. The result showed that under 45 years of age were found to have more lung function disorders. This finding is more because at the age more participants were found smoking. It is strengthened by smoking status, that the prevalence of people who smoke experienced pulmonary dysfunction was higher than those who did not smoke. Smokers have a higher prevalence of respiratory symptoms and lung function abnormalities than non-smokers [17,18]. Some previous studies have demonstrated the effect of smoking on pulmonary function of adults [18,19,20]. Gold et al. found in his research that the FEV1/FVC ratio decreased among adolescent smokers [21]. Female respondents were found more in the study area, and most experienced pulmonary function disorder as much as 26,2% compared to male respondents. It was probably due to housewives who were longer exposed to pollution in the neighborhood. Exposure to air pollutants that can cause various health effects is caused by levels, duration, and frequency of pollutant exposures [3]. Therefore, people who are longer and more often exposed to $PM_{2.5}$ will be more at risk of developing lung function disorders.

In our analysis, the relationship between the concentration of $PM_{2.5}$ exposure with lung function disorder was not found. We found no evidence that living closely to a ready-mix industry area was associated with an increased risk of lung function disorder. Based on the Indonesian Government Regulation concerning control of air pollution, the average value of concentration at the study site was still below the threshold. It is likely that the below-the-threshold concentration affects the absence of the relationship. We found similar results with Pujades-Rodríguez's study that there was no association between living closely to the main road or in an area of increased traffic-related pollution with an increased risk of asthma or COPD [22]. Another research found that the ambient exposure $PM_{2,5}$ in Tangerang and Makasar was higher than the WHO recommended value limit, but there was also no significant relationship between air pollution and impaired lung function in both cities [23].

The limitations in our study were the measurement time of $PM_{2.5}$ concentration was carried out for one hour so that it could not make the average concentration at 24 hours to observe the highest and also the lowest peak time of $PM_{2.5}$ concentration. However, we have conducted a preliminary study before measuring air pollutant to determine the production time in the ready-mix industry, and measurements were taken when the ready-mix industry was operating. In addition, measurements in the outdoor only also did not represent all of the air inhaled by most participants, which were housewives who could have spent more time in the house or room than the outside.

CONCLUSIONS

In conclusion, we found no evidence to suggest that home proximity to ready-mix industry is a major determinant of the risk of lung function disorder. Further research is needed to see early indications of respiratory health problems using other chemical methods and parameters.

Ethical Clearance - Taken from University of Indonesia Ethics Commission

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REFERENCES

1. WHO. WHO Releases Country Estimates On Air Pollution Exposure And Health Impact. World Health Organization. World Health Organization; 2016
2. Cohen AJ, Brauer M, Burnett R, Anderson HR, Frostad J, Estep K, et al. Estimates and 25-year trends of the global burden of disease attributable to ambient air pollution: an analysis of data from the Global Burden of Diseases Study 2015. Lancet [Internet]. 2017;389(10082):1907–18.
3. Hassanvand MS, Naddafi K, Kashani H, Faridi S, Kunzli N, Nabizadeh R, et al. Short-term effects of particle size fractions on circulating biomarkers of inflammation in a panel of elderly subjects and healthy young adults. Environ Pollut. 2017;223:695–704.
4. Gotschi T. Long Term Effects of Air Pollution on Lung Function in The European Community Respiratory Health Survey. Dissertation. University of Southern California; 2007.
5. Araújo IPS, Costa DB, Moraes RJB De. Identification and Characterization of Particulate Matter Concentrations at Construction Jobsites. Sustainability. 2014;6:7666–88.
6. Zhang K, Batterman S. Air pollution and health risks due to vehicle traffic. Sci Total Environ. 2013;(2):307–16.
7. Krzyzanowski M, Künzli N, Gutschmidt K, Pope A, Romieu I, Samet JM, et al. The Global Burden Of Disease Due To Outdoor Air. 2005;1301–7.
8. Novisa R, Ahmadi UF. Analisis Risiko Pajanan PM2, 5 di Udara Ambien Siang Hari terhadap Masyarakat di Kawasan Industri Semen. J Kesehat Masy Nas. 2012;7(4):173–9.
9. Azni IN, Wispriyono B, Sari M. Analisis Risiko Kesehatan Pajanan Pm 10 Pada Pekerja Industri Readymix Pt. X Plant Kebon Nanas Jakarta Timur. J MKMI. 2015;203–9.
10. Riskesdas. Laporan Nasional : Riset Kesehatan Dasar 2013. Badan Litbang Kesehatan. Jakarta; 2013.
11. USEPA. Compendium of methods for determination of inorganic compounds in ambient air. Environ

Prot agency. 1999.

12. Mangunnegoro H, Suryatenggara W, Yunus F, Supandi PZ, Giriputro S, Sutoyo DK, et al. Nilai Normal Faal Paru Indonesia. Jakarta; 1992.
13. US EPA. NAAQS Table 2016 Available from: https://www.epa.gov/criteria-air-pollutants/naaqs-table
14. WHO. Air Quality Guidelines For Particulate Matter, Ozone, Nitrogen Dioxide And Sulfur Dioxide: Global Update 2005: Summary Of Risk Assessment. World Health Organization. 2006. 1-22 p.
15. Wang J, Ogawa S. Effects of Meteorological Conditions on PM 2 . 5 Concentrations in. Int J Environ Res Public Health. 2015;12:9089–101.
16. Ferm M, Sjöberg K. Concentrations and emission factors for PM2.5and PM10from road traffic in Sweden. Atmos Environ. 2015;119:211–9.
17. Lebowitz M, Burrows B. Quantitative Relationships Between Cigarette Smoking and Chronic Productive Cough. Int J Epidemiol. 1977;6(2):107–13.
18. Boskabady MH, Farhang L, Mahmodinia M, Boskabady M, Heydari GR. Comparison of pulmonary function and respiratory symptoms in water pipe and cigarette smokers. Respirology. 2012;17(6):950–6.
19. Tantisuwat A, Thaveeratitham P. Effects of Smoking on Chest Expansion, Lung Function, and Respiratory Muscle Strength of Youths. J Phys Ther Sci. 2014;26(2):167–70.
20. Urrutia I, Capelastegui A, Quintana JM, Muñiozguren N, Basagana X, Sunyer J, et al. Smoking habit, respiratory symptoms and lung function in young adults. Eur J Public Health. 2005;15(2):160–5.
21. Zamel N, Altose MD, Speir WA. Statement on Spirometiy: A Report of the Section on Respiratory Pathophysiology of the American College of Chest Physicians. J Asthma. 1983 Jan 2;20(4):307–11.
22. Pujades-Rodríguez M, McKeever T, Lewis S, Whyatt D, Britton J, Venn A. Effect of traffic pollution on respiratory and allergic disease in adults: Cross-sectional and longitudinal analyses. BMC Pulm Med. 2009;9:42.
23. Haryanto B, Resosoedarmo B, Utami STB, Hartono B, Hermawati E. Effect of Ambient Particulate Matter 2.5 Micrometer (PM2.5) to Prevalence of Impaired Lung Function and Asthma in Tangerang and Makassar. Kesmas Natl Public Heal J. 2016;10(4):145.

The Effect of Nutrition Counseling on Intake of Energy, Protein, and Nutritional Status of Chronic Kidney Disease with Haemodialysis

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ABSTRACT

Background: Haemodialysis patients must get sufficient food intake to remain in good nutritional status, nutrition. Nutrition Counselling is an effort to accelerate the healing process and achieve optimal nutritional status. This study aims to determine the effect of dietary counseling on energy, protein, and nutritional status of Cronic Kidney Disease (CKD) patients with hemodialysis.

Method: This study included analytical research with quasi-experimental research design, which was carried out at general hospital Dr. H Abdul Moeloek Lampung Province. The number of samples was 61 people, consisting of 33 treatment groups and 28 controls. The variables examined were nutritional counseling, energy intake, protein intake, and nutritional status Independent t-test and Mann-Whitney test was employed to investigate the relationship.

Results: In the group that received the nutritional counseling intervention (treatment), poor energy intake decreased by 21.2% compared to the control of only 7.2%. For protein intake, the treatment group of unfavorable protein intake decreased by 6.1%, while the control group did not reduce. Nutritional status is not right in the treatment group while in control it increases by 7.1%. Bivariate analysis showed no significant difference between nutritional counseling with calorie intake, protein intake and nutritional status in both the treatment and control groups.

Conclusion: It is recommended that nutritional counseling is carried out more often by nutritionists to increase the respondent's knowledge and need further research operating variables such as appetite, and the duration of hemodialysis.

***Keywords-**: Energy Intake, Protein Intake, Nutritional Status, Haemodialysis*

INTRODUCTION

Haemodialysis is a process of separating or filtering or cleansing the blood through a semipermeable membrane that is carried out in patients with chronic renal dysfunction [(1)]. Haemodialysis is still the main kidney replacement therapy in addition to kidney transplants in some countries in the world [(2)]. Haemodialysis patients must get sufficient food intake to remain in proper nutrition. Poor nutrition is a significant predictor of death in hemodialysis patients [(3)].

Patients with a chronic renal disease who suffer from malnutrition require higher protein and energy. So it is concluded that the provision of energy intake must be as needed so that the body's tissues do not need to be broken down to produce energy [(3)] and a high-protein diet is intended to maintain nitrogen balance and replace the amino acids lost during hemodialysis therapy [(4)].

The results of previous research [(5)] in chronic kidney disease patients with obtained the inappropriateness in the energy intake, protein intake, and the nutritional

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status. Similarly the results [6]) in another Indonesian' general hospital, it is obtained the poor proportion of respondents who have poor energy intake and protein intake.

Based on the background above, researchers are interested in researching the effect of giving nutrition counseling on energy intake, protein intake and nutritional status of chronic kidney disease patients with hemodialysis in the hospital of Dr. H. Abdul Moeloek Lampung Province in 2017. The hospital was chosen as the location of the study because it was the highest referral hospital in Lampung Province, Indonesia.

METHODOLOGY

This research is analytical with the quasi-experimental design of pre-post-test control group design. The population in this study were all chronic kidney disease patients who underwent hemodialysis therapy at Dr. H. Abdul Moeloek Lampung Province. The number of samples was proportionally designed by two populations and met the criteria obtained by the treatment group 33 people and control group 28 people. Univariate data displayed in percentage and to determine the effect of the intervention on the nutritional status of respondents; the Mann-Whitney test was used..

RESULTS

Sample characteristics consisting of gender, age, and education level are summarized in the following table.

Table 1. Sample Characteristics

Variables	Sample				N	%
	Treatment		Control			
	N	%	N	%		
Sex:						
Men	13	39.4	18	64.3	31	50.8
Women	20	60.6	10	35.7	30	49.2
Total	33	100	28	100	61	100
Ages:						
< 40 years	7	10.6	5	17.8	12	19.7
40 – 60 years	19	78.8	21	75.1	40	65.5
> 60 years	7	10.6	2	7.1	9	14.7
Total	33	100	28	100	61	100
Educational level:						
No School	0	0	1	3.6	1	1.6
Elementary	9	27.3	5	17.9	14	23
Junior High	3	9.1	6	21.4	9	14.8
Senior High	9	27.3	10	35.7	19	31.1
University	12	36.4	6	21.4	18	29.5
Total	33	100	28	100	61	100

The table shows that men sample is 50.8%, and the majority is in the age of 40-60 years (65.5%), and the highest education level is junior high (31.1%).

The result of univariate analysis of the variables of energy intake, protein intake, and nutritional status in the two sample groups before treatment and after treatment is depicted in Table 2. The table shows that the knowledge of energy intake in the treatment group increases by 21.2% while in the control group increases by 7.2%. Also, the experience on good protein intake in the treatment group rises 6.1% while in the control group there is no increase.

Further, The nutritional status of the sample in the treatment group did not change after the intervention, while in the control group malnutrition increased 7.1%.

Table 2. Frequency Distribution of Research Variables Before and After Treatment

Research Variables			Respondents				N	%
			Treatment Group (n=33)		Control Group (n=28)			
			n	%	N	%		
Energy Intake	Before	Poor	31	93.9	25	89.3	56	91.8
		Good	2	6.1	3	10.7	5	8.2
	Total		33	100	28	100	61	100
	After	Poor	24	72.7	23	82.1	47	77
		Good	9	27.3	5	17.9	14	23
	Total		33	100	28	100	61	100
Protein Intake	Before	Poor	25	75.8	20	71.4	45	73.8
		Good	8	24.2	8	28.6	16	26.2
	Total		33	100	28	100	61	100
	After	Poor	23	69.7	20	71.4	43	70.5
		Good	10	30.3	8	28.6	18	29.5
	Total		33	100	28	100	61	100
Nutritional Status	Before	Poor	8	24.2	7	25	15	24.6
		Good	25	75.8	21	75	46	75.4
	Total		33	33	100	28	100	61
	After	Poor	8	24.2	9	32.1	17	27.9
		Good	25	75.8	19	67.9	44	72.1
	Total		33	100	28	100	61	100

The effect of nutritional consultation on energy intake, protein intake, and nutritional status of samples in the treatment group and the control is observable on Table 3.

The table shows that the level of adequacy of energy intake that there is no significant difference in the level of appropriateness of energy intake between the treatment and control groups after the intervention, with a p-value of 0.595. The average percentage of energy sufficiency level after the intervention was 72.5 + 24.21% in the treatment group and 69.1 + 25.19% in the control group.

The independent t-test shows that the level of protein adequacy consumed by the respondents after intervention in the treatment group and control group indicates no significant difference (p-value 0.948) with a mean percentage of protein adequacy level after the intervention was 75.6 + 30.03% in the group treatment and 76.1+ 28.40% in the control group.

Further, before and after the intervention using the Mann-Whitney test showed that there were no significant differences in the two groups, with p-value values p= 0.789 and p= 0.954.

Table 3. Differences in Energy Intake, Protein Intake, and Nutritional Status Before and After Intervention

Research Variables		Treatment (n = 33)	Control (n = 28)	*P*
		Mean ± SD	Mean ± SD	
Energy Intake	Before After	56.3 ± 21.45 72.5 ± 24.21	54.7 ± 15.42 69.1 ± 25.19	0.740 0.595
Protein intake	Before After	66.1 ± 32.36 75.6 ± 30.03	68, 6 ± 18.29 76.1± 28.40	0.723 0.948
Nutritional Status	Before After	21.84 ± 2.25 22.67 ± 3.87	22.07 ± 2.77 22.62 ± 3.91	0.789 0.954

DISCUSSIONS

Giving nutritional counseling to CKD patients with hemodialysis can increase the number of good energy intake because the CKD patients with hemodialysis must get sufficient food intake to remain in proper nutrition. Poor nutrition is a significant predictor of death in hemodialysis patients. The results of good protein intake where all samples can reach 29.5% indicate a better achievement compared to the effects of previous research [5,6].

The sharp protein intake in 31 treatment respondents increased by 6.1% before treatment, while in the control group there was no increase or decrease in good protein intake. This way, giving nutritional counseling to patients with CKD with hemodialysis also can change the number of inadequate protein intake into a better one. So it is recommended that nutrition counseling is more often done by nutritionists to increase the knowledge of patients with the hope that the protein intake can become better.

After the research, the decline in good nutritional status occurred in the control group, while the treatment group did not change the nutritional status. Thus, it can be concluded that the provision of nutritional counseling can prevent the decline in the good dietary state of CKD patients with hemodialysis, considering that patients with CKD tend to experience weight loss due to complaints of nausea and no appetite (anorexia) that often occur in patients [7].

The differences in the level of adequacy of energy intake and protein intake before and after treatment samples were analyzed by independent t-test obtaining no significant differences between treatment groups and control groups with values p-value of 0.595 for energy intake and a p-value of 0.948 at the level of protein intake. Further, the differences in the state of the nutritional status of the sample before treatment and after treatment were analyzed by test Mann-Whitney denoting there was no significant difference between treatment and control groups with p-value values p = 0.789 and 0.954 respectively.

Although the results of this study did not show a significant difference in the intervention in the form of providing nutritional counseling services to energy intake, protein intake, and nutritional status of respondents, based on univariate analysis, there was a better condition in the treatment group than the control group. The increase in good energy intake in the treatment group was 21.2%, while the rise in good energy intake in the control group was 7.2%, as well as an increase in good protein intake in the treatment group at 6.1%, while in the control group there was no increase in intake percentage good protein. In the nutritional status, the treatment group did not change the nutritional status percentage, while in the control group there was a functional decline in nutritional status from 75% before the study, to 67.9% of respondents with good nutritional status.

The success of nutrition counseling service activities is strongly influenced by patient compliance in undergoing diet therapy [7], but from various studies in In Indonesia mainly, shows that adherence to treatment of chronic diseases is generally low [8,9,10]. Thus, further research is needed on the things that affect the success of nutritional counseling services in CKD patients with hemodialysis.

CONCLUSION

Nutrition counseling services by nutritionists for Chronic Kidney Disease (CKD) patients with hemodialysis must be improved in terms of quantity and quality of service. Considering that CKD patients with hemodialysis mostly experience the decrease in appetite, it is expected that the family will motivate and pay attention to the patient's food intake. Further research needs to be done on other factors such as appetite, duration in hemodialysis, adherence to diet and gender therapy with nutritional status in patients for CKD patients with hemodialysis.

Ethical Clearance: Ethical clearance was obtained from the Ministry of Health Polytechnic Tanjungkarang, Indonesia. We also wish to thank all the participants who contributed to this study.

Conflict of Interest: Nil

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REFERENCES

1. Japar KV, Vatvani AD, Waren K, Wibisono P, Alferinda K, Lemuel TA. Prevalence and Characteristics of Patients with Intradialytic Hypertension in Indonesia. Diabetes. 2017 Nov 1;43:37-7.

2. Purnama D, Riono P, Farid MN. The Impact of Diabetes Mellitus and Hypertension As Comorbidon Survival Rate Chronic Kidney Disease on Chronic Haemodialysis Patients (Indonesian Renal Registry Report Analysis 2007–2012). Journal of Hypertension. 2015 Jun 1;33:e13-4.

3. Philips RV, Maidin A, Hadju V, Bahar B. Analysis of the Cost-Effectiveness of Improving Nutrition Intake and Nutritional Status in Patients of Reproductive Age Undergoing Haemodialysis Therapy in Makassar. Indian Journal of Public Health Research & Development. 2018 Jan 1;9(1).

4. Wulandari H, Prasanto H. Comparison between brief food frequency questionnaire and food record to assess the energy and protein intake of hemodialysis patients at Dr. Sardjito Hospital in Indonesia. Saudi Journal of Kidney Diseases and Transplantation. 2018 Jan 1;29(1):145.

5. Susetyowati S, Djarwoto B, Faza F. Nutrition screening tools as a predictor of malnutrition for hemodialysis patients in Dr. Sardjito Hospital in Yogyakarta, Indonesia. Saudi Journal of Kidney Diseases and Transplantation. 2017 Nov 1;28(6):1307.

6. Astuti ND, Syamsiatun NH, Suryani I. Faktor-faktor yang Berhubungan dengan Kualitas Hidup Pasien Gagal Ginjal Kronik yang Menjalani Hemodialisa di Rumah Sakit Umum Daerah Panembahan Senopati Bantul. Jurnal Nutrisia. 2015 Mar 2;17(1):10-6.

7. Suwitra K. Vascular calcification in the chronic kidney. Focus on PAD patients with diabetes and chronic kidney disease. 2014:207.

8. Emaliyawati E, Sriati A. Self-Management and Self-Efficacy In Hemodialysis Patients. Journal of Nursing Care. 2018 Jul 3;1(2).

9. Tahu, S.K., 2017. Konseling analisis transaksional keluarga terhadap kepatuhan manajemen cairan pasien gagal ginjal kronik yang menjalani hemodialisa. CHMK Nursing Scientific Journal, 1(1).

10. Ikaristi S. Kepatuhan Diet dan Kualitas Hidup penderita gagal ginjal Kronik yang dilakukan terapi Hemodialisa di Rumah sakit Panti Rapih. Skripsi, PSIK Fakultas Kedokteran UGM, Yogyakarta. 2003.

Association of Physical Workload with Salivary Cortisol in Clinincal Pharmacist

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ABSTRACT

Objectives: Identify physical workload, identify salivary cortical levels in clinical pharmacist, analyze physical workload and cortical levels in clinical pharmacist **Method**: using calorimeter HR watch to measure physical workload specifically for work metabolic, and using ECLIA method to measure salivary cortical **Result**s: There was a 47.1% correlation between physical workload and cortical levels.

Keywords : *Pharmacist, Workload, Stress, And Salivary Cortisol.*

BACKGROUND

Prolonged negative stress can affect physical and psychological health. Its called distress, can affects the intentions, appearance and daily behavior while working, if the level of distress increases in a company and industry, then there will be decreased performance and the emergence of several diseases caused by stress[27]. Reaction to stress, in the defense mechanism of the body, physically and psychology known as General Adaptation Syndrome (GAS)[27]. There are consist of, the first stage is the alarm stage, then the stage of survival and fatigue stage[27]. At the alarm stage is notification to the body about events that are not in accordance with the expectations, it is necessary to adjust psychologically by physiological coping and adjustment mechanism, where this phase of the body began to secrete hormones for defense. In the autonomic nervous system there are two processes that must run simultaneously when the stress is approaching, the sympathetic nervous system that makes coping mechanisms and parasympathetic nervous system responsible for the increase of the hormone cortisol[27].

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When stress comes, the kidney-parasympathetic kidney system (the adrenal cortex) secretes excessive hormones through the central nervous system of the pituitary gland. The hormone cortisol will affect the metabolism of proteins, carbohydrates and fats in the body. The protein synthesis is reduced and glucose production is enhanced by the mobilization of glycogen reserves, as well as the release of fatty acids into the blood. As a result of these changes, the body can adapt to stressful pressures that threaten it, and therefore cortical plays an important role in the metabolism of carbohydrates. The effect of catabolism from cortical causes the inhibition of protein formation of amino acids, whereas glucose conversion is accelerated, whereas potassium increases excretion by maintaining electrolyte and water balance.

Measurement of cortical in the body especially in the salivary glands has been set as a bio indicator of individual stress response[20]. There is a significant relationship between cortical in saliva and the hormone cortical in the body[28]. Cortical in saliva occurs as a result of activation by the adrenal cortex gland at the alarm stage of the general adaptation syndrome process. Therefore long-lasting stress will continuously increased with very different levels as normal cortical as usual in the body. This will cause changes in function and hormones in the body that should be in a state of normal and down at night but levels remain high at night, especially the hormone cortisol[11].

The greatest factor of job stress in the pharmaceutical worker is the result of much work to be done. That Caused also by a change of mindset and the times, of which initially only aimed for an increase in drug services turn out to be an increase in services to patients[13]. In Johnson et al (2014) study due to overworked workload and the large number of duties of pharmaceutical workers, the turn-over rate increased as well as the occurrence of burn-out syndrome due to the very defeat, causing illness to the pharmaceutical workers. Physiologically, when pharmaceutical workers, are required to work effectively and efficiently, the body will release hormones to match the workload. The hormone release cortical that is needed in the metabolism of carbohydrates and fats for energy formation will soon be adjusted to the needs of the worker's body. This situation is abnormal if the load exceeds the limit that is given that could not be tolerated to cause mental and physical stress, and ultimately change concentrations several hormones in the body quickly[11]. The level of salivary cortical before work and after work can be a biomarker of stress level of physical and mental effort pharmacy so that mistakes in work such as medication errors, and achieve productivity with efficiency and effectiveness in working on the recipe and do not damage the health of workers .

MATERIALS AND METHOD

The study conducted in Pharmacy Installation of Bhakti Dharma Husada General Hospital, Surabaya, East Java province, Indonesia. Population of the study were clinical pharmacist under the pharmacy installation, and worked on emergency unit, outpatient unit, inpatient unit, and drug warehouse, with total population of 20 clinical pharmacist. The variables in this study were cortical in saliva as dependent variable, and physical workload as independent variable. The physical workload is measured using calorimeter HR watch. The calorimeter used for 4 hours as long as they work. Levels of salivary cortical were measured using the ECLIA method (electron chemo luminescent immune assay) taken during and before work.

RESULTS AND DISCUSSION

Pharmaceutical activity such as pharmaceutical preparation, medical devices and medical consumables and clinical pharmacy services demanding very heavy and exhausting physical and mental activity. As a result of physical and mental activity there is an imbalance between the tasks that must be done by pharmaceutical personnel with physiological capacity owned by pharmaceutical workers. This imbalance causes adaptation mechanism. At the time of the adaptation mechanism the body will activate the HPA axis, by producing a large cortical and channeled to several organs for use as a mechanism of body adaptation to workload. This is done so that the body can perform metabolic processes to produce enough energy to meet the physical and mental demands of pharmaceutical personnel.

Physical work is an activity to complete a job requiring physical energy in the human muscle that will serve as a source of energy. Physical work will be entirely dependent on human efforts that serve as a source of energy and work control. Physical demands on pharmaceutical workers such as work stations, workplace layouts, work tools and equipment, working conditions or workplace, work attitude. Physical demands require muscle work during the working period, and energy consumption is a major factor in making the benchmark determinants of weight / light of a job.

The physical work load measuring instrument uses the ultimate gear calorimeter watch. Pharmaceutical workers in pairs of these tools when they start to work and released after the respondents use these watches for 4 hours they work. This HR watch calorimeter works by keeping track of the calories released by the user's body, the calories in the can from the results of metabolism. Metabolism is a chemical process to change some substances especially carbohydrates out heat, that heat will be recorded by the calorimeter. The metabolic process is strongly influenced by the body area then height and weight data is required. If the metabolism process occurs then the activation of HPA axis also occurs, because HPA axis is the activating process of metabolism.

The results of measurements of 16 pharmaceutical workers to remove calories of 100 -200 calories and included in the category of light workload, while 4 people remove calories from 201 to 350 calories and included the category of medium workload. Pharmaceutical work is a category of light work, because pharmaceutical work does not require much muscle activity. The results of the observation of the respondents are more like entering patient data, preparing recipe and communication to fellow colleagues. Activities that are not in a sitting position are when taking drugs on shelves, in warehouses,

counseling with patients and distributing drugs to the spaces and visit with other colleagues.

The measurement of the physical workload using the calorimeter becomes less precise because the number recorded on the monitor is the heat released by the body due to metabolism, while the pharmaceutical work in the cold and moist heat, so that the release of body heat is hampered by cold room. The cold room is required to maintain the stability of drugs stored in the same room where the pharmacy works. Physical workload will produce fairly accurate results if measured not only calories, but calculate the overall energy needs[10]. Energy requirements are needed for basal metabolism, metabolism rest and metabolism work.

The result of statistical analysis, the correlation coefficient of kendall-tau obtained is 0.228, with the strength of the relationship of 47.1%. Correlation coefficient is a test to see how the relationship between independent and bounded variables. Coefficient is 0.228 can be said to be closer to the number 0 which means having a weak relationship, with the strength of the relationship is only 47.1%. The relationship between the variables is weak because the researchers only perform the measurement of 1 metabolism results alone, while for measure physical workload in need calculate the total metabolism. Levels of cortical have metabolic functions throughout the body so it needs to be measured overall as basal metabolism and rest should also be measured. The researchers did not make the measurements because of the limitations of pulse measuring devices, heart rate measurers, and health workers in hospitals unlike workers who have hours of rest because the service to patients is preferred if doing a complete measurement will disrupt the pharmaceutical job.

Results from the measurement of cortical levels 20 pharmaceutical population of 5 people had elevated levels of cortical after work. When viewed from the workload that tends to be mild and moderate, 5 pharmaceutical workers are producing excessive levels of cortical. This abnormal level of cortical may occur because the pharmaceutical worker must continue to perform all of the pharmaceutical work to serve the patient, other peers, while in the body continuously activates the HPA axis pressure, causing cortical levels that do not follow the rhythm diurnal with the level high because it always activates cortical secretion.

According to Manauba (2000), task demands in this case the task and material characteristics, organizational characteristics and environmental characteristics must be balanced with a person's work ability, if the demands of work are too low or too high will cause stress. Judging from the demands of pharmaceutical work is in need of speed and accuracy, while the physiological ability of the pharmaceutical workers is cortical levels in abnormal circumstances, there is an upside down situation. This situation is turning to prepare a work full of pressure so that the body is always vigilant. Jobs that are too low because of the work of pharmacy is a job that is not much use of muscle, so that energy is not much for physical activity but mental activity, so it needs to do a review related to the pharmaceutical task in do 5 people. Working efficiently is expected to increase the rest time so that it can be productive again, while not working for 1 month, it is necessary to reduce the task because the pharmaceutical worker is still in the process of adjusting the given task.

CONCLUSION

Physical workload for clinical pharmacist in pharmaceutical installations in hospitals account for 16 pharmaceutical workers have calories of 100 - 200 calories in the category of light workload, while 4 people have calories from 201 to 350 calories and in the category of medium workload There is a weak correlation between the physical workload is 0,228 with the strength of the relationship is only 47.1%.

Conflict of Interest: None

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Ethical Clearance: The research proposal has been approved by Health Research Ethical Commission of Public Health Faculty Airlangga University, number: 540-KEPK. All respondents were given explanation and information about the purposes and methods of the research, and also had signed informed consent forms.

REFERENCES

1. Batista, Patricia. Anabela Pereira. Ana Beatrz Vaz. (2017) Salivary Biomarkers In Psychological Stress Diagnosis. ARC Journal Of Pharmaceutical Sciences. Vol. 3 February 2017. Pages 9 -18

2. Beall, Jeninifer W. Renee M. DeHart. Robert M.Riggs. John Hensley. (2015) Perceived Stress, Stressors, And Coping Mechanism Among Doctor of Pharmacy Student. Pharmacy 3. November 2015. Pages 344-354

3. Bozovic, Djordje. Maja Rajic. Nedeljka Ivkovic. (2013) Salivary Cortisol Levels as a Biological Marker Of Stress Reaction. Med Arh. October 2013. Pages 371 -374

4. Burke, Heather M. Mary C. Davis. Christian Otte, David C. Mohr. (2005) Depression And Cortisol Response To Physiological Stress : A Meta Analysis. Elsevier LTd. 30.February 2005. Pages 845 – 846

5. Carnagie, Rebecca. et. al (2017) Cortisol Awakening Response and Subsequent Depression : Prospective longitudinal study. The British Journal Of Pshychiatry 204 .January 2017. Pages 137-143

6. Haryanti, Faridah Aini, Puji Purwaningsih. (2013) .Relationship Between Workload With Stress Work Nurse At Emergency Installation Hospital Semarang Regency. Journal of Nursing Management. Vol. 1.No.1 . Mei 2013. Pages 48 – 56

7. Hellhammer, Dirk H. Stefan Wust. Brigitte M. Kudeilka. (2009). Salivary Cortisol as Biomarker In Stress Research. Elsevier. Vol. 34.Pages 163 - 171

8. Imron TA, Moch (2010). Health Sector Methodology. Surabaya: PT. Sagung Seto, Pages 117-112

9. Imron, Akhmad, (2014). Factors Affecting Working Stress In Children Fruit Ship (Study On Passenger Ship and Ship Goods at Port of Tanjung Perak Surabaya). Thesis. FKM University of Airlangga.

10. Iridiastadi Hardianto, Yassierli, (2016). Ergonomics An Introduction. Bandung: PT. Remaja Rosdakarya, Pages 151 – 183

11. Ivkovic, Nedeljka. Et al .(2015). Biomarkers of Stress in Saliva .Scientific Journal of The Faculty Of Medicine in Nis. Vol. 32.Pages 91 - 99

12. Jobin, Joelle. Carsten Worsch, Michael F. Scheier. (2014) Associations Between Dispositional Optimist And Diurnal Cortisol in a Community Sample : When Stress Is Perceived As Higher Than Normal. Health Psychol. 33 (4). April 2014. Pages 382 – 391

13. Johnson. S.J. et. al (2014) The Relationships Among Work Stress, Strain And Self Reported Errors in UK Community Pharmacy. Elsevier Inc. 2014 Vol 1

14. Jung, Christopher. M et. al (2010). Acute Effect of Bright Light Exposure on Cortisol Levels .J Biol Rhythm. Vol. 3.Juni 2010.Pages 208 – 216

15. Koh, David Soo-Quee. Gerald Chon-Nuat Koh (2007). The Use Of Salivary Biomarkers In Occuptional And Environmental Medicine. Occupational Environment Medicine. Vol. 64. 2007. Pages 202 - 210

16. Lentjes, E.G.W.M, F.H.T.P.M. Romjin (1999) Temperature-Dependent Cortisol Distribution Among The Blood Compartment in Man. J Clin Endocrinol Metab. Vol. 84. 1999. Pages 682 - 687

17. Maurits, Lientje Setyawati K. (2010).Overview About Work Fatigue. Yogyakarta : Amara Books 2010

18. McCann, Laura et. al. (2009). Assessing Job Satisfaction And Stress Among Pharmacists In Northern Ireland. Pharm World Sci 31 . January 2009.Pages 188 – 194

19. Munger, Mark A. et. al. (2013) Community Pharmacist Occupational Satisfaction And Stress : A Profession In Jeopardy. Journal Of The American Pharmacists Association 53 .Juni 2013. Pages 282 - 296

20. Nakajima, Yasushi. et. al. (2012) Patterns Of Salivary Cortisol Level Can Manifest Work Stress in Emergency Care Providers. Journal Physiol Sci 62 (3). Mei 2012. Pages 191 – 197

21. NIOSH, (2014).Exposure To Stress Occupational Hazard In Hospital. NIOSH

22. Ojerinde, Abosede Catherine, Prisca Olabisi Adejumo, (2014) Factors Associated With Medication Errors Among Health Workers in University College Hospital Nigeria. Journal of Nursing and Health Science.Vol.3. June 2014.Pages 22-33

23. Olds, Danielle. M, Sean P.Clarke (2010) The Effect of Work Hours on Adverse Events and Errors in Health Care. Journal Safety.Vol.41 No.2. April 2010. Pages 153-162

24. Rasfa, Asrar Fuad, Cecelia SW, Arie Desrianty. (2014). Mental Load Evaluation Machinist by the Subjective Workload Assessment Technique (SWAT) and amylase activity in saliva, Online Journal National Institute of Technology.Vol.1. No.4.April 2014.Pages 90 – 97

25. Rehan, Harmeet Singh, Shashikinant Bharvaga. (2015). Medication Errors are Preventable. Journal Pharmacovigilane. Juni 2015

26. Rothmann, Sebastian (2007) Occupational Stress of Hospital Pharmacist In South Africa. International Journal Pharmacy Practice 15 . April 2007. Pages 1-8

27. Selye H. A Syndrome of produced by diverse nocuous agents. Nature 138:32

28. Seo, Sang Hee. (2016) Detection of Chronic Stress Using Bio-Signals. Indian Journal of Science And Technology. Vol. 9 No.46. December 2016.

29. Sugiatmajaya, Safaat, Cecelia SW, Yuniar, (2014). Evaluation of Stress Levels of Machines based on Salivary Alpha-Amylase Activity (Case Study at PT Kereta Api Indonesis Area Operasi 2 Bandung), Journal Online National Institute of Technology. Vol.2. No.2.October 2014. Pages 90 – 97

30. Sugiyono, (2016).Research Methods, Quantitative, Qualitative, and R & D. Bandung: Publisher Alfabeta, Pages 30 -166.

31. Suma'mur. (2014) Company Hygiene and Occupational Health (Hiperkes).Surabaya : Sagung Seto 2014

32. Taban, Ebrahim, et, al (2016) Noise Exposure Effect On Blood Glucose, Cortisol and Weight Changes in The Male Mice, Journal Health scope. 18 July 2016

33. Tajuddin Rusmi Sari, Indrianty Sudirman, Almin Maldin. (2012). Factor Causes Medication Error On Emergency Treatment installation. Journal of Health Services Management.Vol.15. No.4.December 2012.Pages. 182 -187

34. Tarwaka (2011). Industrial Ergonomics: The Basics of Ergonomic Knowledge and Application in the Workplace. Solo : Harapan Press 2015. Pages 103 -141

35. Thayer, J.F, et, al (2010) Effect of the Physical Work Environment on psychological Measures of Stress. Europe journal cardiovascular Prev Rehabil.Vol. 17. August 2010. Pages 431 -439

36. Tsao, Nicole. W et, al (2014) Decentralized Automated Dispensing Devise : Systematic Review Of Clinical & Economic Impact For Hospital. The Canadian Journal Of Hospital Pharmacy. March – April 2014. Pages 138 -148

37. Utami, (2016).The Role of Spiritual Training Dzikir Against Changes Of Perception And Improvement Distress Bargain In Hospital. Dissertation. FKM University of Airlangga

38. Widajati, Noeroel (2015). Development of NIOSH Model About Unsafe Action On Job Stress Condition of Production Workers at Steel Construction Company. Dissertation. FKM University of Airlangga

39. Wijono Sutarto, (2014). Industrial Psychology & Organization. Revised Edition. Jakarta: Pt. Kencana Perdana Media Grup, Pages 143 – 166.

Knowledge and Attitudes of Nursing Staff in AL-Suwaira General Hospital about Cervical Cancer

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ABSTRACT

Objective(s): To assess level of knowledge and attitude to nursing staff about cervical cancer in Al-Suwaira general hospital.

Material and Method: A descriptive cross-sectional study using questionnaire include (150) female nursing staff selected from Al-Suwaira General Hospital.Sampling technique was simple random sampling .The data collection through direct interview by researcher with each sample lasted from 5th December 2017 to 1st March 2018.The study was approved by the Center Ethical Committee.The data analysis methods used in order to examine and evaluate the results of study by applied (SPSS) program: Frequency distributions, percent and mean of score were calculated to illustration nurse's knowledge and attitudes about cervical cancer.

Findings: This study indicated that (68.0%) of respondents recognized that Pap smear is used for recognition of cervical cancer.Only (31.3%) knew human papilloma virus infection as a risk factor, (60.7%) knew that cervical biopsy is used for diagnosis of cervical cancer ,most of participants were (60.7%) knew the Pap smear test that can be used for prevention of cervical cancer.Approximately (70.0%) believed that cancer in cervix treated by Chemotherapy ,(65.3%) were in absence of indication to responses for not screening patients and (65.3%) were no reason to reasons for not getting self-Pap smear.In all responses were inadequate knowledge of cervical cancer and negative attitude.

Conclusions: The majority of nursing staff in Al-Suwaira general hospital may have inadequate knowledge and their negative attitude about cervical cancer.

Recommendations: Emphasis on routine training through health education programs by seminars, lectures and courses about cervical cancer on a regular basis or as part of the orientation program for female nursing staff.

Keywords: *Cervical cancer, knowledge,Nursing staff, Attitude.*

INTRODUCTION

Cervical cancer is disease of public health concern world-wide.It's kind of cancer that arises in the cells of cervix that is inferior part of uterus that connect to vagina [1]. It's second greatest common cancer amongst women world-wide and appraised 530,232 new cases and 275,008 deaths,approximately 86% of cases arise in developing countries, representative 13% of female cancers [2,3].Though, it's considered one of the most avoidable cancers.Population based cervical smear screening programs for cancer in cervix have shown the effectiveness of screening in decreasing mortality [4].Greatest woman with cervical cancer in countries existing with progressive disease, resultant in little cure rates.Numerous reasons contribute to great burden of disease and advanced phase at presentation including lowly knowledge about disease additionally there is an absence of screening amongst overall population [5].

Cervical cancer is essentially produced by persistent infection with certain kinds of human papillomavirus (HPV) are responsible for nearly 70% of cervical cancer cases in whole countries around the world [6,7]. Traditional hazard reasons for increasing cervical cancer such as numerous sexual partnerships, young

age at first pregnancy,oral-contraceptive use,smoking, immunosuppressive disease and sexually transmitted diseases [8].

Iraq have 10.74 million of population in women at the ages 15 years and older who may be danger of developing cervical cancer. Recent assessments that each year 291 women diagnosed with cervical cancer and die 142 from disease. Cervical cancer positions as 12th most recurrent cancer amongst women in Iraq and the 10th most recurrent cancer in women amongst (15) and (44) years of age [9].

Treatment of cervical cancer reliant on phase of disease, age and medical state of patient, features of tumor.Routes could be monotherapy or combined; they range from ionization of the cervix,simple hysterectomy with or without lymphadenectomy,radical hysterectomy with pelvic lymphadenectomy,pelvic exenteration, chemotherapy, radiotherapy, to palliative chemotherapy. Treatment in the early phase has the greatest prognosis with the maximum cure rates [10].

MATERIAL AND METHOD

A descriptive cross-sectional study carried out (150) female nursing staff selected from AL-Suwaira General Hospital, to study their knowledge and attitudes about cervical cancer. Selection of sampling Technique were simple random sampling were each member of a population has the similar chance of being included within the sample.The data collection was through the direct interview by researcher with each sample lasted from 5th December 2017 to 1st March 2018.The study instrument (questionnaire) which contain three parts:**Part 1:** Socio-demographic characteristics,the questions in this module contains 4 items.**Part 2:** Nursing Staff knowledge,The knowledge question consist of (34) items, Correct response and incorrect response are distributed with (1, 2 and 3) scoring scale, answered know, not sure and don't know ,correct response were (know) while incorrect response were (not sure and don't know).**Part 3:** Nursing Staff Attitudes,The attitudes question consist of (11) items, assessment by scores scales (Yes, and No) in relative to (1 and 0) respectively.

The data analysis methods were used in order to examine and evaluate the results of the study under application of the statistical package (SPSS)ver. (21):Frequency distributions, percent and mean of score were calculated to display the knowledge and attitudes of nurses about cervical cancer. Knowledge scores ranged from 1–3 and the level of (1 – 2) was set for inadequate knowledge and (2.1–3) for adequate knowledge. The responses of participants over attitudes statement were measured on scores ranged from 1–3, Score of ≥ 1.5 was taken as positive attitude, while < 1.5 as negative attitude.

FINDINGS

Table (1): Distribution of the Socio-demographic Characteristics among samples

Socio-demographic characteristics		**F**	**%**
Age	19-23	**69**	**46**
	24-28	49	32.7
	≥ 29	32	21.3
	Total	150	100
Marital Status	**Married**	**90**	**60**
	Unmarried	51	34
	Widowed	4	2.7
	Divorced	5	3.3
	Total	150	100

Cont... **Table (1): Distribution of the Socio-demographic Characteristics among samples**

Educational Level	**Nursing Secondary**	**75**	**50**
	Nursing Institute	47	31.3
	Nursing Bachelors	25	16.7
	Nursing Master and above	3	2
	Total	150	100
Residence	Urban	113	75.3
	Rural	37	24.7
	Total	150	100

F = Frequency,% = Percentage.

Table (1) shows that the majority of sample at the age (19-23) years .The high percentage of participants were (60 %),(50 %) and (75.3 %) for married."Education of level"at nursing secondary and "Residency" in urban respectively.

Table (2): Distribution the Knowledge of samples about Cervical Cancer

Items	**Correct response**		**Incorrect response**	
	F	**%**	**F**	**%**
Cervical cancer is a disease of public health concern	**136**	**90.7**	14	9.3
Pap smear used for detection of cervical cancer	**102**	**68.0**	48	32.0
If cervical changes are found early they are easily curable	61	40.7	**89**	**59.3**
Risk factors of cervical cancer				
The virus that causes the disease,HumanPapilma Virus	47	31.3	**103**	**68.7**
Early age marriage	51	34.0	**99**	**66.0**
Family history of cervical cancer	51	34.0	**99**	**66.0**
Use contraceptives (Intrauerine Device,pills)	50	33.3	**100**	**66.7**
Smoking	41	27.3	**109**	**72.7**
Poor hygiene	**82**	**54.7**	68	45.3
Immunocompromised women	47	31.3	**103**	**68.7**
Signs and symptoms of cervical cancer				
Asymptomatic	52	34.7	**98**	**65.3**
Foul smelling excessive vaginal discharge	41	27.3	**109**	**72.7**
Abnormal vaginal bleeding	46	30.7	**104**	**69.3**
Post-coital vaginal bleeding	38	25.3	**112**	**74.7**
Dyspareunia	32	21.3	**118**	**78.7**
Fever	**81**	**54.0**	69	46.0
Headache	**84**	**56.0**	66	44.0
Pelvic pain	36	24.0	**114**	**76.0**
Post-menopausal bleeding	35	23.3	**115**	**76.7**
Who should be screened for cervical cancer				
Married women	42	28.0	**108**	**72.0**
Women >= 30 years of age	35	23.3	**115**	**76.7**
Women < 30 years of age	42	28.0	**108**	**72.0**
Diagnosatic modilaties other than pap smear				
Visual inspection after acetic acid application	34	22.7	**116**	**77.3**
Colposcopy	40	26.7	**110**	**73.3**

***Cont.*. Table (2): Distribution the Knowledge of samples about Cervical Cancer**

Cervical biopsy	**91**	**60.7**	59	39.3
Prevention of cervical cancer				
Cervical cancer vaccine	71	47.3	**79**	**52.7**
Pap smear test	**91**	**60.7**	59	39.3
Hormonal medications	**77**	**51.3**	73	48.7
Exercise	**82**	**54.7**	68	45.3
Maintain a healthy lifestyle	**86**	**57.3**	64	42.7
Stop smoking	47	31.3	**103**	**68.7**
Treatment of cervical cancer				
Chemotherapy	**105**	**70.0**	45	30.0
Surgery	74	49.3	**76**	**50.7**
Radiation therapy	40	26.7	**110**	**73.3**

F = Frequency,% = Percentage.

Table (2) this table revealed that knowledge of nurses participants, the number that given a bold pattern illustrate the high percentage of correct and incorrect response.

Table (3):Distribution the Attitudes of samples about Cervical Cancer

Items	**Yes**		**NO**	
	F	**%**	**F**	**%**
Responses for not screening patients				
Absence of indication	**98**	**65.3**	52	34.7
Lack of vaginal speculum	67	44.7	**83**	**55.3**
Speculum examination and pap smear are doctors procedure	69	46.0	**81**	**54.0**
Not applicable	58	38.7	**92**	**61.3**
Reasons for not getting self pap smear				
No reason	**98**	**65.3**	52	34.7
Not feeling at risk	67	44.7	**83**	**55.3**
Lack of symptoms	70	46.6	**80**	53.4
If women is a virgin, pap smear test will affect virginity	74	49.3	**76**	**50.7**
Feeling shy to have pap smear	**78**	**52.0**	72	48.0
Afraid of outcome	**86**	**57.3**	64	42.7
Not applicable	64	42.7	**86**	57.3

F = Frequency,% = Percentage.

Table (3) shows that the responses for not screening patients, a (65.3%) of respondents thought absence of indication. Regarding to reasons for not getting self-pap smear,most (65.3%) of respondents cited “no reason” for not undertaking a Pap smear test.

Table (4):Measure the level of Knowledge and Attitudes to samples about Cervical Cancer

Knowledge			
Level	M.S	F.	%
Inadequate	1 – 2	118	78.6
Adequate	**2.1 – 3**	32	21.4
Total	**1 – 3**	**150**	**100%**
Attitudes			
Positive	≥ 1.5	**65**	**43.3**
Negative	< 1.5	**85**	**56.7**
Total	1 – 3	150	100%

F = Frequency,% = Percentage, M.S = mean of the score.

Table (4) this table indicate that the overall level of knowledge and attitudes to samples about cervical cancer was inadequate knowledge (78.6 %) and negative attitude (56.7 %).

DISCUSSION

Cervical Cancer is avoidable disease and key feature of its prevention is discovery of its premalignant form by screening at an early age [11]. The study showed that most of samples at age (19-23) years,were (46%). According to marital status the highest number of nurses were married (60%).These results were similar to study[12],showed (54.6 %) of participants were married. Relative to educational level a large percentage of nurses were (50.0 %) among nursing secondary.The study incompatible with result [5], suggested that the majority of nurses staff were (87.2%) among Bachelor.This different may be due to presence of nursing secondary in the district of Al-Suwaira where graduated a number of nursing cadres be employed in the Al-Suwaira general hospital.Regarding to residency the majority of the participants were (75.3 %) in urban.These findings are consistent with previous study [13],found that highest percentage of nursing staff were (60.7%) in urban.

Regarding to knowledge of nursing staff about cervical cancer,from all participants,were (90.7%) knew cervical cancer is disease of public health concern. This result is agreement with results [14], mentioned that the high percentage were (63.2%) aware the cervical cancer is disease of public health concern,in all responses were (40.7 %) of them recognized that if cervical changes are found early they are easily curable. This results not similar to study [14], found (75.9%) knew if cervical variations are establish early they are easily curable. This difference may be due to different educational level between countries.

Responses of nursing staff about risk factors of cervical cancer were (31.3%) correctly responses HPV infection as cause of cervical cancer and heredity (34.0%) as a risk factors for cervical cancer. This study result coincides with results [2], showed (38.6 %) and (31.0%) of participants knew that the HPV and heredity, respectively,as cause of cervical cancer.

A small proportion of the nurses had adequate knowledge of signs and symptoms of cervical cancer then were correct responses (27.3%), (30.7%) and (25.3%) as foul smelling excessive vaginal discharge,abnormal vaginal bleeding, post-coital vaginal bleeding respectively.The results of this study is compatible with study [5], found responses of nursing staff were small in excessive vaginal discharge,abnormal vaginal bleeding and post-coital vaginal bleeding as (20%),(40%) and (3%) respectively. This explained unaware the nursing staff about signs and symptoms of cervical cancer in countries.

According to who should be screened for cervical cancer,for each participants were low percentage gave correct response as (28.0%), (23.3%) and (28.0%) in married women, women >= 30 years of age and women < 30 years of age respectively.This result is agree with finding [15], found small responses for who should be screened for cervical cancer then were (25.1%), (40.5%) and (34.3%) in married women, women >= 30 years of

age and women < 30 years of age respectively.

Regarding to diagnostic modalities other than pap smear, were (22.7%) of participants knew around visual inspection after acetic acid application (VIA),(26.7%) knew about Colposcopy and the high proportion of respondents were (60.7%) knew about cervical biopsy used diagnosis of cervical cancer. These results are agreement with result [2],found (4.5%) knew around (VIA) and (19%) knew about Colposcopy. Also another studies were done by [14,15],showed a large number of participants were (89.5%) and (94.1%) respectively, knew about cervical biopsy used diagnosis of cervical cancer.

According to prevention of cervical cancer,a large proportion of participants were (60.7%) knew about Pap smear test can used to prevention of cervical cancer. This results is compatible with results [5], found the high response were (75%)%) knew about Pap smear test can used to prevention of cervical cancer.

The greatest common treatment of cervical cancer identified from all participants was chemotherapy (70.0%).The present study is consistent with results [13],showed chemotherapy was most common (77.2%) form of treatment recognized by the participants, another study is disagree with our results [10], found a high percentage of participants were (70.8%) gave correct response about radiation therapy. This difference may be due to the belief of the majority of nursing staff in Iraq that the treatment of most cancers is using chemotherapy.

Regarding to attitudes of nursing staff about cervical cancer, responses for not screening patients, a (65.3%) of participants thought absence of indication, followed by speculum examination and pap smear are doctors procedure (46.0%), lack of vaginal speculum (44.7%) and (38.7%) were response for not applicable. This study is incompatible with results [14], found most responses were (79%) in speculum examination and Pap smear are doctors procedure, followed by not applicable (53.4%), absence of indication (16.1%) and (8%) were in lack of vaginal speculum. This difference may be due to the different belief of the respondents between countries, as well as the reason, according to the examination conducted in each country.

Responses of participants about reasons for not getting self-pap smear were (65.3%) to no reason for concern a Pap smear test. This result is similar to study [15], showed a large number of participants were (43.5%) gave answered for no reason to Pap smear test. This means that in every country there is not enough reason not to have self-examination or a Pap smear test.

Regarding to overall level of knowledge to nursing staff about cervical cancer was inadequate knowledge (78.6 %). This study is consistent with result [15],found the level of knowledge to nursing staff about cervical cancer were inadequate (73.3%) of respondents, also another study done by [12], showed the nursing staff have a moderate level of knowledge regarding cervical cancer. This may explain the lack of understanding of the nursing staff about importance and severity of cervical cancer, and also may be due to similar educational level between countries. According to the overall level of attitudes to nursing staff about cervical cancer was negative.This result is similar to results[14], found attitudes to nursing staff about cervical cancer were negative of all responses. This may illustrate due to comparable education level between countries.

CONCLUSIONS

The majority participants were nursing staff at the age of 19-23 years, most of them were married and have completed their nursing secondary. The overall level of knowledge and attitudes were inadequate knowledge and their negative attitudes about cervical cancer.

RECOMMENDATIONS

Emphasis on routine training through health education programs by seminars,lectures and courses about cervical cancer on a regular basis or as part of the orientation program for female nursing staff. Furthermore, if nurses themselves undertake screening test repeatedly, they can be part models for the other females.

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REFERENCES

1- Ibrahim U.Assessment of Cervical Cancer Knowledge,Perception and Prevention Attitude among Female Students of Reproductive Age (16 – 49) In Four Tertiary Institution Within Bauchi Metropolis. International Journal of Advancements in Research & Technology 2014;3(11):1-6.

2- Goyal A,Vaishnav G,Shrivastava A, Verma R, Modi A.Knowledge ,Attitude & Practices about Cervical Cancer and Screening among Nursing Staff in a Teaching Hospital. International Journal of Medical Science and Public Health 2013;2 (2):249-253.

3- Saja J,Ban A, Jasim M.In Hybridization Approach for Detection of Epstein-Barr Virus and Human Papilloma Virus Type 16 in a Group of Iraqi Women with Cervical Cancer.AL-Taqani Journal 2014;27(2):22-13.

4- Al-Meer FM, Aseel AT,Al-Khalaf J.Knowledge,attitude and practices regarding cervical cancer and screening among women visiting primary health care in Qatar.Eastern Mediterranean Health Journal 2011;17(11):855-861.

5- Ali SF, Ayub S, Manzoor NF, Azim S,Afif M,Akhtar N et al. Knowledge and Awareness about Cervical Cancer and Its Prevention amongst Interns and Nursing Staff in Tertiary Care Hospitals in Karachi,Pakistan .PLoS ONE 2010;5(6): e11059.

6- Liu T,Li Sh,Ratcliffe J,Chen G.Assessing Knowledge and Attitudes towards Cervical Cancer Screening among Rural Women in Eastern China. International Journal of Environmental Research and Public Health 2017;14(9): 967-977.

7- Jasim M,Sahira H.Evaluation of the role of HPV16, CMV and EBV in Cervical Carcinoma progression using in Situ Hybridization technique.Diyala Journal of Medicine 2016; 11(1):37-43.

8- Osman MT,Al-Naggar RA ,Taha BI.Knowledge and Awareness of Cervical Cancer Screening among Iraqi Immigrant Women Living in Malaysia.World Journal of Medical Sciences 2013;8 (2):123-129.

9- HPV Information Center:Human Papillomavirus and Related Cancers.Fact Sheet,2017. Available at: http://www.hpvcentre.net/statistics/reports/IRQ_FS.pdf

10- Urasa M,Darj E.Knowledge of cervical cancer and screening practices of nurses at a regional hospital in Tanzania.African Health Sciences 2011; 11(1): 48 – 57.

11- Matah M,Sareen S.Detection of HPV by PCR-A novel step in the prevention of Cancer Cervix. Journal of ObstetGynaecol India 2012;62 (2):188-191.

12- Nganwai P,Truadpon P,InpaCh, Sangpetngam B,Mekjarasnapa M,Apirakarn M et al. Knowledge,Attitudes and Practices vis-à-vis Cervical Cancer Among Registered Nurses at the Faculty of Medicine,KhonKaen University,Thailand.Asian Pacific Journal of Cancer Prevention 2007;9(8):15-18.

13- Rahman H, kar S.Knowledge,attitudes and practice toward cervical cancer screening among Sikkimese nursing staff in India.Indian Journal of Medical and Paediatric Oncology 2015;36(2):105-110.

14- Singh E, Seth Sh,Rani V,Srivastava DK.Awareness of cervical cancer screening among nursing staff in a tertiary institution of rural India.Journal of Gynecologic Oncology 2012; 23(3):141-146.

15- Shekhar Sh,Sharma Ch,Thakur S,Raina N.Cervical Cancer Screening:Knowledge, Attitude and Practices among Nursing Staff in a Tertiary Level Teaching Institution of Rural India.Asian Pacific Journal of Cancer Prevention 2013;14(6):3641-3645.

Physical Environment of Houses as Determinants of Pneumonia among Children in Country Sides

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ABSTRACT

Background: Pneumonia is an acute infection of the lung tissue (*alveoli*) most prevalent in infants. Home physical environment that does not meet the health requirements is to trigger the occurrence of the disease. This study aims to determine the relationship between the home physical environment with pneumonia in infants.

Method: The method used is a case-control with an analytical approach. 60 respondents are selected where 30 respondents serve as a treatment group, and the rest is as a control one. The research was conducted in Baturaden, Banyumas Regency, Central Java, Indonesia. The variables studied are living room ventilation width, window width, wall type, floor types, and room‘ occupation density. The research employs Chi-Square test to find the relationship between variables.

Results: The results showed the physical environment of the house that has a significant relationship with the incidence of pneumonia among children.

Conclusion: Since the physical environment of the house still risk factors for pneumonia ignored by the community, the community health center must play more active roles in disseminating the information to the society about the importance of proper physical environment condition.

Keywords: *Physical environment, house, pneumonia, children, window*

INTRODUCTION

Factors affecting the health of both the individual and the public are an environment, behavior, services, and descent [(1)]. Environmental factors are the most prominent factor to do with the transmission of diseases, especially infectious diseases. The closest environment to the human being is housing as people spend time sitting at home making the house as a residence must always consider the aspects of health.

Pneumonia kills more children than any other disease, covering nearly 1 in 5 deaths of children and infants, killing more than 2 million children under five each year and the majority occur in developing countries [(2)]. World Health Organization (WHO) estimates that the incidence rates of pneumonia in countries with infant mortality rates above 40 per 1,000 live births are 15% -20% per year in the toddler age group. The incidence of pneumonia in Indonesia in infants is estimated between 10% - 20% per year.

Central Java Province ranks the fifth in the number of pneumonia of children under five around 18, 477 cases, and when seen from the case fatality rate (CFR)’s infants, the province is ranked the 16th with numbers of CFR approximately 10% [(3)].

Banyumas District as one of the regencies in Central Java displays the of cases of pneumonia with were 860 where the highest position was found in the area of Baturaden with the prevalence of 87 cases. Previous research [(4)] showed that the physical environment of the house that has a relationship with the incidence of acute respiratory infections are the humidity, ventilation, types of floor, and occupant density but the temperature and lighting of the house that does not have a significant relationship but risky. As such, this research would like to expand the previous study by identifying factors

related to pneumonia in children by observing the physical condition of the houses.

METHODOLOGY

This research is an analytic observational study using a design of *case-control* comparing the physical environment of respondents homes or patients with non-cases ones. The research was conducted with the physical condition of houses regarding the total area of ventilation, spacious windows, type of wall, floor types and density of occupants with children under five years of age. The population in this study were all toddlers in Health Community Service or *Pusat Kesehatan Masyarakat* Baturaden II with the sample size of 30 infants diagnosed suffering from pneumonia and the control as many as 30 healthy infants. Data collected then tabulated and analyzed descriptively with a frequency distribution table as well as Chi-Square to see the relationship between the dependent and independent variables.

RESULTS

Ventilation of family room in case group showed 27 respondents (90%) include the category of not eligible (<10% of floor area) and three respondents (10%) include the suitable (floor area ≥ 10%). Further, 30 measurements in the control group showed 16 respondents (53.3%) including ineligible categories (<10% of floor area) and nine respondents (15%) including in the category of meeting the requirements (≥ 10% of floor area). Further, the results of chi-square test showed p-value 0.004 less than $\alpha = 0.05$, revealed the significant association between the family room ventilation with the incidence of pneumonia in young children. Besides, the calculation of odds ratios indicates the value of 7.875 meaning toddlers in the family room ventilation conditions that do not meet the requirement will have 7.875 times (rounded to 8) higher risk for pneumonia than the family room ventilation conditions complying to the health requirement.

Window size in the case group showed 29 respondents' (96.7%) property were in ineligible (< 20% of floor area) and only one respondent (3.3%) meeting the requirement of health standard (≥ 20% of floor area). In the other hand, in the control group, there were 25 respondents (83.3%) included into ineligible categories (<20% of the floor area) and five respondents (16.7%) included in the group of eligible (≥ 20% of floor area). The results of chi-square test showed p-value 0.001 smaller than $\alpha = 0.05$ indicating there is a significant relationship between the window size with pneumonia in young children. The calculation of odds ratios report the value of 5.800 meaning toddlers with an odd volume of windows are risky 5.800 (rounded to 6) times higher to be infected with pneumonia.

The wall condition in a case group indicated four respondents' (13.3%) walls are not eligible and 26 respondents (86.7%) had suitable family room walls (waterproof). Besides, in control group there were three respondents (10%) had ineligible family room walls and 27 respondents (90%) had waterproof wall room. The results of chi-square test showed p-value 0.001 smaller than $\alpha = 0.05$ indicating there is the significant relationship between the condition of living room wall with the incidence of pneumonia in young children. The calculation of odds ratios indicate the value of 1.385 meaning toddler with improper living room wall will be at risk 1.385 (rounded to 1) time greater than those in the waterproof living room.

The conditions of the floor in case group revealed two respondents (6.7%) had a property floor that is not waterproof and 28 respondents (93.3%) had the waterproof floor. In control group only one respondent (3.3%) with the non-waterproof floor. The results indicates that both control and case groups have been in compliant with the requirement. Chi-square test showed p-value= 0.001 smaller than $\alpha = 0.05$ suggesting there is a significant relationship between the type of living room floor with the incidence of pneumonia in young children. The calculation of odds ratios indicate the value of 2.071 meaning toddlers with the non-waterproof floor will be at risk 2.071 (rounded to 2) times greater to be affected by pneumonia.

The room occupation density refers to the number of people sleeping in the bedroom (maximum 3). In case of the group, there are 28 respondents (93.3%) whose bedroom was crowded and only two respondents (6.7%) included in the category of eligible occupant density. In the control group, there were 27 respondents (90%) fall into not qualified occupant density, and three respondents (10%) fall into the category of eligible occupant density. Results categorization generally indicate that bedroom in both control and case groups are occupied by many people which is typically in rural areas due to big family members. Chi-square test shows the p-value 0.000 less

than α = 0.05, revealing the significant relationship between the density of occupancy with the incidence of pneumonia in young children. The calculation of odds ratios indicate the value of 1.556 meaning the toddler sleeping with many family members are at risk 1.556 (rounded to 2) times greater to be affected by pneumonia.

DISCUSSION

Spacious living room ventilation has a significant relationship with the incidence of pneumonia in infants. The result of the study is in line [5] which shows that large family room ventilation associated with acute respiratory infection in infants.

Spacious house ventilation function for setting the air, because the condition of the walls of the house can contribute to the creation of humidity and temperature that allows germs will die or multiply. Spacious house ventilation air circulation is beneficial for the entry of ultraviolet light to reduce evaporation in the room. High humidity can be caused by moisture from human sweat and breathing which is dangerous to health if there is a cause of pneumonia [6].

Size of living room window has a significant relationship with the incidence of pneumonia in infants. The results are consistent [7] that the window size has an association with the occurrence of pneumonia in infants. Lack / insufficient ventilation (<10% of the floor area of the room) would make the pollutants in the room are longer and will add to the risk of exposure to contaminants in the place [8]. The window would not function properly if kept closed or are permanently made of glass that can not be opened. The window that cannot be opened would make the bedroom becomes stuffy and humid enabling the development of pathogenic microorganisms, one of the organisms that cause pneumonia. Therefore, the windows should also be impermanent to be open every day so that air can flow out smoothly [9].

Wall function is a supporting the roof to protect the house against rain, heat, and wind from outside. Type of wall has a significant association with the incidence of pneumonia in infants. The magnitude of the risk of suffering from pneumonia could be seen from OR = 2.9 means children under five living in the house with the condition of the wall, did not qualify with a risk of pneumonia was three times greater than toddlers who stay at home with the state of the house walls meet requirements. The results of this study differ [10] which showed that no significant relationship between the type of wall with acute respiratory infection in infants.

The house with an earthen floor will cause home space hot, dusty, and more humid. Warm temperatures can increase evaporation in the room, so it's not just the humidity increased, but also the content of pollutants coming from home building materials. High humidity (> 80%) is a good condition for the growth and survival of bacteria cells (pneumococcus) so that the bacteria can multiply. State of the floor has a significant relationship with the occurrence of pneumonia. The magnitude of the risk of suffering from pneumonia could be seen from OR = 3.9, which means children under five living in the house with this type of flooring is not eligible with a risk of pneumonia was four times greater than toddlers who stay at home with this type of flooring qualifies. The risk of pneumonia would be higher if the toddlers often play on the floor that is not eligible [6].

House floor construction must be watertight and always dry so it can be easily cleaned of dirt and dust, but it can avoid the rising groundwater that can increase the humidity in the room. To prevent the ingress of water into the house, the floor should be raised approximately 20 cm from the ground. The floor made of the soil should not be used anymore because during the rainy season, this floor will be moist and can cause diseases to occupants. Therefore it is necessary to install tiles or waterproof coating [11].

There is a significant correlation between the density of occupant with the incidence of pneumonia in infants. More and more residents are gathered in one room is a potential risk for the transmission of a disease, especially for children who are relatively vulnerable to disease transmission [12]. The solution that can be given if the family really can not afford the room economically is to arrange the items in the room and not too much stuff in the places. Crowded house occupants allow transmission of bacteria, viruses that cause respiratory illnesses from pneumonia through which the occupants of the house to the other occupants of the house easily and quickly.

CONCLUSION

The results of house physical condition relationship with the incidence of hepatitis A in children under five in Community Health Center or *Puskesmas* I Baturraden in Central Java, Indonesia are summed up as follows:

There is a connection between family room ventilation with the incidence of pneumonia in young children. The odd ratios indicate that toddlers in the family room ventilation conditions that do not meet the requirement will have eight times greater risk for pneumonia than the family room ventilation conditions complying with the health requirement.

There is a significant relationship between the window size with the pneumonia in young children. The odds ratio indicate that toddlers with an odd size of windows are risky six times greater to be infected with pneumonia.

Type of wall has a significant association with the incidence of pneumonia in infants. The odds ratio indicate children under five living in the house with the condition of the wall did not meet the health requirement will have a risk of pneumonia three times greater.

There is a significant relationship between the type of living room floor with the incidence of pneumonia in young children. The odds ratios indicate that toddlers with the non-waterproof floor will be at risk two times greater to be affected by pneumonia.

There is the significant relationship between the density of occupancy with the incidence of pneumonia in young children. The odds ratios indicate that the toddler sleeping with many family members are at risk two times greater to be affected by pneumonia

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REFERENCES

1. Anwar, A., & Dharmayanti, I. (2014). Pneumonia pada Anak Balita di Indonesia. Jurnal Kesehatan Masyarakat Nasional, 8(8), 359–365.
2. WHO, UNICEF. 2006, Pneumonia: The forgotten killer of children. Geneva: WHO Press..
3. Depkes RI. 2012, Pedoman Pemberantasan Penyakit Infeksi Saluran Pernafasan Akut untuk Penanggulangan Pneumonia pada Balita, Jakarta: Depkes RI.
4. Yulian Irfan Widodo. 2014, Hubungan lingkungan fisik rumah dengan kejadian penyakit Infeksi Saluran Pernafasan Akut (ISPA) pada balita di Desa Karangrau Kecamatan Banyumas Kabupaten Banyumas tahun 2014, Purwokerto: Kementerian Kesehatan Republik Indonesia Politeknik Kesehatan Kemenkes Semarang.
5. Sherly Candra Dewi. 2014, Hubungan kondisi fisik rumah dengan kejadian ISPA pada balita di Wilayah Kerja Puskesmas I Purwokerto Timur Desa Arcawinangun tahun 2014, Purwokerto: Kementerian Kesehatan Republik Indonesia Politeknik Kesehatan Kemenkes Semarang .
6. Yuwono, T. A. (2008). Faktor- Faktor Lingkungan Fisik Rumah Yang Berhubungan Dengan Kejadian Pneumonia Pada Anak Balita di Wilayah Kerja Puskesmas Kawunganten Kabupaten Cilacap. Universitas Diponegoro, 1–98.
7. Padmonobo, H., Setiani, O., & Joko, T. (2013). Hubungan Faktor-Faktor Lingkungan Fisik Rumah dengan Kejadian Pneumonia pada Balita di Wilayah Kerja Puskesmas Jatibarang Kabupaten Brebes. Jurnal Kesehatan Lingkungan I, 11(2), 194–198.
8. Aditya Mahardini (2013). Studi korelasi antara suhu dan kelembaban rumah dengan kasus ISPA pada balita di Kelurahan Kober Kecamatan Purwokerto Barat Kabupaten Banyumas tahun 2013. Purwokerto: Kementerian Kesehatan Republik Indonesia Politeknik Kesehatan Kemenkes Semarang .
9. Pramudiyani, N. A., & Prameswari, G. N. (2011). Hubungan Antara Sanitasi Rumah dan Perilaku dengan Kejadian Pneumonia Balita. Jurnal Kesehatan Masyarakat, 6(2), 71–78.
10. Susanto AD, Prasenohadi, Yunus F. 2010. The Year of the Lung. Available from:http://www.2010yearofthelung.org.
11. Djasio Sanropie, dkk., 1989. Pengawasan Kesehatan Lingkungan Pemukiman untuk Institusi Pendidikan Tenaga Sanitasi Kesehatan Lingkungan, Jakarta: Pusdiknakes Depkes RI.
12. Anik Maryunani. 2010, Perilaku hidup bersih dan sehat, Jakarta: C.V Trans Info Media.

Efficacy and Safety of Mirabegron in Treatment of Overactive Bladder (Dose Range Study)

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ABSTRACT

Overactive bladder (OAB) is a condition characterized by urinary urgency, usually accompanied by frequency and nocturia, with or without urge urinary incontinence. this prospective study aimed to discuss the pharmacotheraputic aspects of mirabegrone in treatment of overactive bladder. Hence a total of 71 patients with diagnosis of overactive bladder were enrolled and randomly assigned into two groups; mirabegron 50 and B who received 50 and 100 mg mirabegrone , respectively and patients were followed for 8 weeks.

Only 66 patients completed the study . Mirabegron at doses of 50 and 100 mg once daily demonstrated improvement from baseline to final visit in reducing the mean number of micturitions per 24 hours which increased with mirabegron dose but no significant improvement between mirabegron groups. There's significant improvement between mirabegron groups in mean baseline to end-of-treatment for urgency episodes ($p<0.001$) and level of urgency incontinence ($p<0.01$) . In conclusion, Mirabegron at doses of 50 and 100 mg once-daily over 8 weeks demonstrated satisfactory balance between efficacy and tolerability in Overactive Bladder patients.

***Keywords**: Overactive Bladder, Mirabegron, urinary urgency, nocturia, urinary incontinence*

INTRODUCTION

Overactive bladder (OAB) is a condition characterized by urinary urgency, usually accompanied by frequency and nocturia , with or without urgency urinary incontinence [1]. Urgency with at least one other symptom is essential to diagnose OAB. Thus urgency is the pivotal symptom. In many OAB patients, urge incontinence occurs, defined as involuntary leakage of urine, accompanied or immediately preceded by urgency[2]. Overactive bladder affects 10-16% of the population in the world [3]. Rates were similar in men &women, increasing with age in both sexes, but , OAB wet‖ is more prevalent in women and OAB dry‖ is more prevalent in men[4]. Chronic, bothersome OAB-associated symptoms significantly impact quality of life (QOL) an increase the likelihood of sleep deprivation, depression, falls, and fractures [5–8]. There are three main hypotheses proposed for etiological pathogenesis of OAB, the first is the Neurogenic, myogenic and integrative hypotheses [2,9]. Unfortunately, many OAB patients remain undiagnosed and untreated. Successful treatment of OAB depends on a detailed evaluation and treatment in a timely fashion with vigilant follow up. There are many facets of management of the OAB, including pharmocotherapy[2,10].

Pharmacotherapy

The Currently available oral agents for therapy of the OAB are summarized in table 1

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Table 1. Currently available oral agents for therapy of the OAB [11–13]

Drug	Special consideration
Antimuscarinics Oxybutynin Tolterodine Solifenacin Darifenacin	Increased CNS effects and dry mouth/constipation Renally cleared
Beta -3 AR Agonist Mirabegron	May elevate Blood pressure
Antidepressants Imipramine Duloxetine	Elderly patients are susceptible to many side-effects ,should be used, with close monitoring, particularly for psychiatric and cardiac side-effects. Tricyclic antidepressant drugs have antimuscarinic activity

Mirabegron

Mirabegron is an oral medication that actively selects beta3 adrenoreceptors. It is a lipophilic compound .it is metabolized in the liver by cytochrome P450 3A4 (CYP3A4)and 2D6 (CYP2D6) to form its active compound [14]. Stimulation of b3-adrenoceptors elicits direct relaxation of detrusor smooth muscle[15]; Mirabegron is rapidly absorbed after oral administration and circulates in plasma in its unchanged form, its glucuronic acid conjugates, and other metabolites, which are pharmacologically inactive. Mirabegron is metabolized in the liver via multiple pathways[14,16]**.** Mirabegron indicated in Urinary frequency, urgency, and urge incontinence. Cautions when history of QT-interval prolongation and use with drugs that prolong the QT interval its contraindication is severe hypertension[17] . It is administered in 25,50,100mg once daily in adults [18] .

MATERIAL AND METHOD

This was a prospective comparative study including 71 patients diagnosed with overactive bladder ,on follow-up in urology consultation unit and department in Ghazi AL Hariri surgical specialty hospital in Baghdad medical city complex, during the period from October 2013 to October 2015 , only 66 patients completed the study 34 in mirabegron 50 (received 50 mg) Mirabegron and 32 patients in mirabegron 100 (received 100 mg) Mirabegron . Patients with Clinically significant bladder outflow obstruction, significant postvoid residual (PVR) volume (>200 ml). Stress urinary incontinence , Indwelling catheters or intermittent self-catheterization, diabetic neuropathy, symptomatic urinary tract infection, interstitial cystitis, bladder stones, malignancy, previous pelvic radiation , Known or suspected hypersensitivity to mirabegron, or any ingredient and clinically significant cardiovascular or cerebrovascular disease, were excluded. Patients in both groups followed for 10 weeks. Patients asked to rate the degree of associated urgency on the five-point of Patient Perception of Intensity of Urgency Scale (PPIUS) at each micturition or incontinence episode. Then the scale evaluated according to the scores where zero indicated no urgency, one for mild, two for moderate and 3 for severe urgency score of 4 indicated urge incontinence. At each visit the PPIUS score was assessed and Blood and urine samples tested to monitor the safety. Statistical analysis: with the statistical package for social sciences version 20 and appropriate statistical tests and procedures were applied, level of significance set at 0.05.

FINDINGS

Only 66 out of 71 patients (93%) completed the follow up period and they were 34 in mirabegron 50 and 32 in mirabegron 100 . The baseline demographic characteristics are summarized in (Table 2). Mirabegron 50 and100 mg resulted in a mean baseline to end-of treatment reduction of 2.3 and 2.25 micturitions per 24 h, respectively. Responders at the endpoint were 26.4 % for mirabegron 50 and 31.2 % for the mirabegron 100. There's no significant difference in improvement between both groups but a significant difference in urgency episodes and level of urgency incontinence ($p<0.05$). Responders for urgency incontinence episodes (patients who became dry) were 41.1% for mirabegron 50 mg; and 46.8% for mirabegron 100 mg. Responders for urgency episodes (grade ≥ 3) were 14.7% for mirabegron 50 mg; and 21.8% for mirabegron 100 mg and for nocturia episodes was 20.5 % for mirabegron 50 mg; and 18.7% for mirabegron 100 mg. (Table 3

and 4).The overall incidence of Treatment-emergent adverse events (TEAEs) was almost similar across treatment groups and there was no evidence of a dose–response relationship. The overall incidence of TEAEs in Mirabegron 50 mg was (47%), and in mirabegron 100 mg group it was (43.7%), (Table 5). In terms of vital signs seemed to increase in a dose-related manner. No differences between treatment groups were observed with respect to ECG parameters. (Table 4) There was no significant change in mean PVR volume at 4 , 8 ml for mirabegron 50, and100 mg, respectively. There were no clinically significant changes in laboratory parameters.

Table 2: Demographic and baseline characteristics.

Characteristic		**Mirabegron 50 mg (n=34)**	**Mirabegron 100 mg (n=32)**
Age (years) mean ± SD		52.24 ± 7.78	50.63 ± 8.62
Sex, n (%)	Male	12 (35.3)	14 (43.8)
	Female	22 (64.7)	18 (56.3)
Type of OAB, n (%)	Urge incontinence only	16 (47.1)	12 (37.5)
	Mixed incontinence	8 (23.5)	10 (31.3)
	Without incontinence	10 (29.4)	10 (31.3)
Duration of OAB symptom(months) mean ± SD		41.24 ± 26.12	45.38±25.35

SD: standard deviation

Table 3. Adjusted changes from baseline to endpoint and estimated differences for efficacy variables by treatment group (full analysis set).

Characteristic	**Mirabegron 50 mg (n = 34)**	**Mirabegron 100mg (n = 32)**	**P value**
Micturitions/24hr after treatment	2.3	2.25	0.374
Mean volume voided/micturition(ml)	26.7	25.9	0.348
Urge Incontinence episodes/24hr after treatment	1.055	1.034	0.795
Urgencyepisodesper24hr after treatment	-1.57	-2.23	<0.001
Nocturia episodes/24hr after treatment	0.551	0.582	0.418
Level of urgency / 24 hrs	-0.17	-0.28	< 0.001

Table 4. Proportions of responders for selected efficacy variables at the study endpoint.

Variable	**Mirabegron 50 mg (n=34)**	**Mirabegron100 mg (n=32)**	**P. value**
Micturitions / 24 h	26.4%	31.2%	NS
Incontinence episodes/24	41.1%	46.8%	NS
Urgency episodes (grade ≥3)/24 h	14.7%	21.8%	Sig
Nocturia episodes/24 h	20.5%	18.7%	NS

*Responder definitions: micturitions, <8 micturitions/24 h; no incontinence episodes, no episodes of either urgency and nocturia.

NS: not significant (P.value > 0.05), sig: significant (P.value < 0.05)

Table 5. Treatment-emergent adverse events (TEAEs)

TEAEs	Mirabegron 50 mg (n=34)	Mirabegron100 mg (n=32)
Overall	47%	43.7%
Dry mouth	5.8%	5.9%
Constipation	5.8%	3.1%
Headache	5.8%	5.9%
Eye disorder (blurred vision)	2.9%	3.1%
HT	8.8%	6.2%
Tachycardia	2.9%	5.9%
Urinary retention	0%	0%
Liver function (GGT)	0%	3.1%
Others*	29.4%	28.1%

* Others TEAEs: nausea ,dyspepsia ,dizziness, fatigue, pruritus and skin rash.

DISCUSSION

Mirabegron at different doses demonstrated improvement from baseline to final visit in reducing the mean number of micturition per 24 h which increased with mirabegron dose but no significant improvement between mirabegron groups, which disagreed findings of Scorpio and Aries [12,19]

In the dose-ranging Dragon study, the primary efficacy results showed dose dependent decreases in mean number of micturition in 24 hours, which were statistically significant improvement compared with placebo [20]. In TAURUS study, the 50- and 100-mg mirabegron groups showed numerical improvements in mean number of micturition in 24 hours [21].

The responders for micturition frequency were 26.4 % for mirabegron 50 mg, and 31.2 % for the mirabegron 100-mg group. In Dragon study, it was 27.5% for mirabegron 50 mg, and 32.7% for the mirabegron 100-mg group [20]. For Secondary efficacy outcomes ,there's significant improvement between mirabegron groups in urgency episodes ($p<0.001$) and level of urgency incontinence ($p<0.01$), but there's no significant improvement in volume voided per micturition, urgency incontinence episodes and nocturia episodes . For Scorpio and Aries studies [12,19], a significant improvements were found for both doses of mirabegron compared with placebo in all secondary efficacy outcomes. In the Dragon study, there's a dose-dependent increase in the mean volume voided/micturition, and a decrease in the number of incontinence episodes, number of UUI and urgency episodes [20]. The TAURUS study was demonstrate a numerical improvements from Month 1 to Month 12 in incontinence episodes in 24 hours, and MVV/micturition in the 50- and 100-mg mirabegron groups[21] . For urgency incontinence episodes , the responders were 41.1 % for mirabegron 50 mg; and 46.8% for mirabegron 100 mg ,for urgency episodes (grade ≥3) were 14.7% for mirabegron 50 mg; and 21.8% for mirabegron 100 mg and for nocturia episodes were 20.5 % for mirabegron 50 mg; and 18.7% for mirabegron 100 mg. At the final visit, the percentage of responders for zero incontinence episodes was 43.4% and 45.8% in the 50- and100-mg mirabegron groups, respectively in The TAURUS study [21], responder analyses showed a significant improvement with mirabegron 50 and 100 mg in terms of dry rates, > 50% reduction in mean number of incontinence episodes/24 h at final visit In Nitti V W study [22]. Dragon study, showed 41.7 % for mirabegron 50 mg; and 55.9% for mirabegron 100 mg ,for urgency episodes (grade ≥3) was 14.5% for mirabegron 50 mg; and 19.6% for mirabegron 100 mg and for nocturia episodes was 23.9 % for mirabegron 50 mg; and 14.2% for mirabegron 100 mg [20]. The TEAEs with an incidence of (47%), and (43.7%) in the 50- and 100-mg mirabegron groups, respectively. There was no evidence of a dose–response relationship . Safety data from Scorpio and Aries studies showed that the overall incidence of TEAEs was similar across treatment groups [12,19] . In the 12-month TAURUS study, the incidence of TEAEs was similar across the 50-mg mirabegron (59.7%), 100-mg mirabegron

(61.3%).The most frequent TEAEs included hypertension, dry mouth, constipation, and headache,

occurring at similar incidence rates across the treatment groups [21]. In Dragon , the incidence of TEAEs was(43.8–47.9%) across the mirabegron treatment groups. The most common drugrelated TEAEs were gastrointestinal disorders, occurring at (8.3%)and (9.5%) across the 50-mg mirabegron and 100-mg mirabegron treatment groups, respectively. While dry mouth about (1.8%) and (3%) across the 50-mg mirabegron and 100-mg mirabegron treatment groups, respectively [20]. No significant drug effect on systolic or diastolic blood pressure was observed; the net changes blood pressure from baseline in both mirabegron groups ,were <2 mm Hg. The adjusted mean change in morning pulse rate from baseline was 2.6 bpm for mirabegron 50 mg and4.9 bpm for mirabegron 100 mg, pulse rate was seen to increase in a dose-related manner. In Nitti VW, study, mirabegron was associated with approximate increases of < 1 mmHg in blood pressure and>1 bpm in pulse rate. The incidence of hypertension was similar among the total mirabegron group [22]. In Novara G, et al study, data show a mirabegron-related dose response elevation in heart rates of 6.7 bpm and 11 bpm for the 50- and 100-mg dose groups, respectively, and 24-hour mean increases in systolic blood pressure of 3.0 mmHg and 5.5 mmHg, respectively [23]. In the SCORPIO, ARIES and 12-month TAURUS studies, mirabegron was associated with an increase of <1 mmHg in blood pressure compared with placebo [12,19,21]. There was no significant change in mean PVR volume , at 4 , 8 ml for mirabegron 50, and100 mg, respectively with no episodes of acute urinary retention . Safety data from SCORPIO and ARIES studies showed that the mean change from baseline to final visit in PVR volume was unremarkable across treatment groups [12,19]. In the Dragon study, no episodes of acute urinary retention were reported [20] .In the BLOSSOM study, no clinically relevant effects on post void residual (PVR) volume were reported [24].

CONCLUSIONS

Mirabegron at doses of 50 and 100 mg once-daily over 8 weeks demonstrated satisfactory balance between efficacy and tolerability in OAB patients, there's symptomatic improvement in the micturition frequency , urgency and urge incontinence in adult patients with OAB .However, There is the potential for interactions with other (CYP3A4) and (CYP2D6) substrates as well as a potential effect on the cardiovascular system.

Ethical clearance:

The participants' data were collected in accordance with the World Medical Association Declaration of Helsinki 2013, and each participant was informed about the nature and the main objective of the study and signed an informed consent. All official agreements were obtained prior to patients enrollment

Conflict of Interest Author declared: None

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REFERENCES

1. Haylen BT, Ridder DD, Freeman RM, et al. An International Urogynecological Association (IUGA)/International Continence Society (ICS) joint report on the terminology for female pelvic floor dysfunction. NeurourolUtodynam 2010;29:4–20.
2. Drake M, Abrams P. Overactive Bladder. CAMPBELL-WALSH UROLOGY. 10th edition. V1; 2012 :1947-1950.
3. Wang CC, et al. Clinical guideline for male lower urinary tract symptoms associated with non-neurogenic overactive bladder.Urological science 2015;Vol.26(1):7-16.
4. Gomelsky A, Dmochowski RR. Overactive bladder in males. therapeutic Advances in urology 2009;1(4):209-221.
5. Milou DB. Female sexual function and urinary incontinence. Doctoral Thesis , Department of Urology and the Department of Anatomy and Embrylogy, Faculty of Medicine / Leiden University Medical Center (LUMC), Leiden University 2011:7-20. Available from https://openaccess.leidenuniv.nl/handle/1887/16684, accessed on June,04, 2015.
6. Gołąbek T, Skalski M, Przydacz M, Świerkosz A, Siwek M, Gołąbek K, Stangel-Wójcikiewicz K, Dudek D, Chłosta PL. Lower urinary tract symptoms, nocturia and overactive bladder in patients with depression and anxiety. Psychiatr. Pol. 2016;50(2):417-30.
7. Chiarelli ,et al. Urinary incontinence is associated with an increase in falls : a systematic review .Aust.J.Physiotherapy ;2009,55:89-95.

8. Nitti VW. Clinical Impact of Overactive Bladder. Rev Urol 2002;4(supple 4):S2–S6.
9. Ritchie J. The Role of Cell-Cell Contact and Intercellular Junctions in the Pathogenesis of Detrusor Overactivity. McGill 2003:5-31.
10. Lee UJ, Scott VC, Rashid R. Defining and managing overactive bladder: disagreement among the experts. Urology. 2013;81(2):257–262.
11. Reynard J, Brewster S, Biers S. Incontinence and female urology. Oxford handbook of urology.3rd edition ;2013:148-150.
12. Khullar V, Amarenco G, Angulo JC Efficacy and tolerability of mirabegron, a ß3-adrenoceptor agonist, in patients with overactive bladder: results from a randomized European-Australian phase 3 trial. EurUrol 2013; 63:283-295 .
13. Dmochowski RR. Duloxetine: a summary of published clinical experience. Rev Urol. 2004;6 (Suppl 3):S56-63.
14. Litsuka H , Katashima M, Sawamoto T, et al. Pharmacokinetics of Mirabegron, a β3-AdrenoceptorAgonist for Treatment of Overactive Bladder, in Healthy East Asian Subjects. Clin. Therap. 2015 ; 37: 1031–1044.
15. Frazier EP, Peters SL, Braverman AS. Signal transduction underlying the control of urinary bladdersmoothmuscletonebymuscarinicreceptors and b-Adrenoceptors. NaunynSchmiedebergs Arch Pharmacol 2008; 377:449-62 .
16. Takusagawa S, van Lier JJ, Suzuki K, Nagata M, Meijer J, Krauwinkel W, Schaddelee M, Sekiguchi M, Miyashita A, Iwatsubo T, van Gelderen M. Absorption, metabolism and excretion of [14C] mirabegron (YM178), a potent and selective β3-adrenoceptor agonist, after oral administration to healthy male volunteers. Drug Metabolism and Disposition. 2012 Jan 23: dmd-111.043588; DOI: https://doi.org/10.1124/dmd.111.043588
17. Ah-See KW, Badminton MN . Drugs for urinary frequency, enuresis, and incontinence. BNF. 67;2014: 544-546.
18. Mirabegron (BetmigaTM) budget impact calculation. Job bag number: BT13008UK. January 2013. AstellasPharma Ltd.
19. Nitti VW, Auerbach S, Martin N, Calhoun A, Lee M, Herschorn S. Results of a randomized phase III trial of mirabegron in patients with overactive bladder. The Journal of urology. 2013 Apr 1;189(4):1388-95.
20. Chapple CR, Dvorak V, Radziszewski P, et al. A phase II doseranging study of mirabegron in patients withoveractive bladder. IntUrogynecol J 2013;24:1447-58.
21. Chapple CR, Kaplan SA, Mitcheson D, et al. Randomized doubleblind, active-controlled phase 3 study to assess 12-monthsafety and efficacy of mirabegron, a ®3-adrenoceptor agonist, in overactive bladder. EurUrol 2013;63:296-305.
22. Nitti VW, Khullar V, Van Kerrebroeck P, Herschorn S, Cambronero J, Angulo JC, Blauwet MB, Dorrepaal C, Siddiqui E, Martin NE. Mirabegron for the treatment of overactive bladder: a prespecified pooled efficacy analysis and pooled safety analysis of three randomised, double-blind, placebo-controlled, phase III studies. International journal of clinical practice. 2013 Jul;67(7):619-32.
23. Novara G, Cornu JN. Mirabegron as a new class of oral drug for overactive bladder syndrome: many positive perspectives, some concerns. EurUrol 2013;63:306-8.
24. Chapple CR, Amarenco G, López Aramburu MA, Everaert K, Liehne J, Lucas M, Vik V, Ridder A, Snijder R, Yamaguchi O, BLOSSOM Investigator Group. A proof-of-concept study: Mirabegron, a new therapy for overactive bladder. Neurourology and urodynamics. 2013 Nov;32(8):1116-22.

Analysis of Factors Associated with Blood Sugar Levels in Type 2 Diabetes Mellitus Patients

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ABSTRACT

Background: The prevalence of diabetes mellitus in Indonesia ranks 7 under Russia and Mexico with diabetes rates as much as 10.0 million (8.7% -10.9%), Lampung Province ranks 8th.The purpose of this study was to determine the risk factors for blood sugar levels in type II diabetes mellitus patients.

Methods: This type of research was analytic with cross-sectional design in Persadia Bandar Lampung Hospital patients using a sample of 30 people. The research variables were blood glucose levels, knowledge, nutritional intake (carbohydrates, fiber, and vitamin C), physical activity, and dietary compliance. Chi-Square test was employed to examine the relationship.

Results: The results showed there was a relationship between simple carbohydrate intake (p = 0.002), fiber (p = 0. 000) and vitamin C (p = 0.002), physical activity (p = 0.000), compliance between types of food consumed with blood sugar level (p = 0.026). There was no correlation between total adherence (p = 4.48), schedule compliance (p = 1,000), diet compliance with blood sugar levels. .

Conclusion: Hospital should be able to increase education about nutrition as well as encourage eating fiber and vitamin C food as recommended and motivate patients to be more adherent to the diet. Further research with different methods is necessary to explore what factors cause low levels of compliance.

Keywords-*: Diabetes Mellitus, Nutritional Intake, Physical Activity, Diet Compliance, Blood Sugar Levels.*

INTRODUCTION

Diabetes erupts (DM) is a metabolic disease which is a collection of symptoms that arise in a person due to an increase in blood glucose levels above average values. The prevalence of DM in Indonesia is based on the answer that the doctor had diagnosed at 1.5%, whereas DM based on symptoms was 2.1%. The prevalence of DM in women is based on a doctor's diagnosis of 1.7% while signs based on DM are 2.3%. Meanwhile, the determination of DM based on a doctor's diagnosis was 1.4% while DM based on symptoms was 2.0%, so based on this it is concluded that female sufferers of DM were higher than men [(1)].

Fiber can improve the response of blood glucose and insulin indices. The fiber can inhibit the passage of glucose through the walls of the digestive tract to the blood vessels so that levels in the blood are not excessive. The previous study showed a significant relationship between fiber intake and blood sugar levels in diabetic patients [(2)]. Other studies have also demonstrated a link between fiber intake and blood sugar levels that the lower the fiber intake, the higher blood sugar levels [(3)].

In people with diabetes, it is essential to emphasize the importance of regularity of eating regarding meal schedule, type and amount of food, especially for those who use blood glucose-lowering drugs or insulin [(4)]. Physical exercise in people with diabetes mellitus has a critical role in controlling blood sugar levels. Increased physical activity such as physical exercise (aerobics, casual cycling, jogging, swimming, and diabetes

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exercise) regularly results in increased use of glucose by active muscles [5].

In Pesadia Hospital Lampung Province, out of 100 patients, 30 people were suffering from diabetes mellitus. Based on the description of data above, the authors wish to examine the analysis of risk factors for blood sugar levels in type II diabetes mellitus patients in the respective hospital.

METHODOLOGY

This study is an analytical study using a cross-sectional examines the risk factors for blood sugar levels in type II diabetes mellitus patients in Persadia Adventist Hospital Bandar Lampung Unit. The population in this study were all patients with type II diabetes mellitus who were members of PERSADIA Bandar Lampung Adventist Hospital Unit in 2017 obtained as many as 30 people. The sample of this study is the total population. Data analysis was carried out with univariate analysis carried out descriptively with a frequency distribution. Bivariate analysis was performed by Chi-square test using computerization.

RESULTS

Respondents mostly were aged> 60 years of the 22 respondents (73.3%), and respondents whose aged between 41-60 years were eight respondents (26.7%). The sex of the respondents was 7 male respondents (23.3%), and as many as 23 respondents were female (76.7%). The education level of the most respondents was tertiary institutions with a total of 11 respondents (36.7%).

Most respondents work as housewives or do not work as many as 13 respondents (43.3%), while the least jobs are other jobs as many as 4 respondents (13.3%), which are included in different positions of the cook, housemaid, and foreman.

As many as 14 respondents (46.7%) had bad blood sugar, and as many as 16 respondents had good blood sugar with a percentage of 53.3%. Distribution of respondents based on knowledge showed that those with fewer categories were 12 people (40.0%) and good as many as 18 people (60%). The simple carbohydrate intake of respondents was obtained which was not good (high) which was 15 people (50.0%), while the simple carbohydrate intake of respondents was good was found in 15 people (50.0%). Besides, most of the respondents' fiber intake is in quite a category was as many as 17 respondents (56.7%), while respondents who have less fiber intake are 13 respondents (43.3%). For consumption of vitamin C intake with less intake, there were 14 respondents (46.7%), while respondents who had good vitamin C intake were 16 respondents (53.3%). Physical activity of respondent inactive was found in 12 people (40.0%), whereas the physical movement of the respondent in the good category was in 18 people (60.0%). Distribution of respondents based on the type of food obtained results from 30 respondents whose intake of non-compliant foods was 16 people (53.3%), and respondents who obeyed 14 people (46.7%). Distribution of respondents based on the meal schedule obtained the results that the respondents whose eating schedule was not obedient as many as 16 people (53.3%), while respondents who obeyed 14 people (46.7%).

Table 1.Relationship of Knowledge with Blood Sugar Levels

Variables	Blood Sugar Levels				Total		*P value*
	Poor		Good				
	N	%	N	%	N	%	
1. Knowledge							
Less	9	75	3	25	12	100	0.030
Good	5	27.8	13	72.2	18	100	
Total	14	46.7	16	53.3	30	100	
2. Fibers							
Less	11	84.6	2	15.4	13	100	0.001
Adequate	3	17.6	14	82.4	17	100	
Total	14	46.7	16	53.3	30	100	

Cont... **Table 1. Relationship of Knowledge with Blood Sugar Levels**

3. Vitamin C							
Less	12	85.7	2	14.3	14	100	0.000
Good	2	12.5	14	87.5	16	100	
Total	14	46.7	16	53.3	30	100	
4**.Carbohydrate Intake**							
Poor	13	86.7	2	13.3	15	100	0.000
Good	1	6.7	14	93.3	15	100	
Total	14	46.7	16	53.3	30	100	
5. Physical Activity							
Active	10	83.3	2	16.7	12	100	0.004
Inactive	4	22.2	14	77.8	18	100	
Total	14	43.3	16	56.7	30	100	
6. Compliance to portion							
Compliance	12	46.2	14	53.8	26	100	1.000
Non-compliance	2	50.0	2	50.0	4	100	
Total	14	46.7	16	53.3	30	100	
7. Compliance to types							
Compliance	11	68.8	5	31.2	16	100	0.026
Non-compliance	3	21.4	11	78.6	14	100	
Total	14	46.7	16	53.3	30	100	
8. Compliance to Schedule							
Compliance	9	56.2	7	43.8	16	100	4.48
Non-compliance	5	35.7	9	64.3	14	100	
Total	14	46.7	16	53.3	30	100	
9. Compliance to Diet							
Compliance	13	48.1	14	51.9	27	100	1.00
Non-compliance	1	33.3	2	66.7	3	100	
Total	14	46.7	16	53.3	30	100	

Respondents with insufficient knowledge revealed 75% had poor blood sugar levels and those with good knowledge indicated 27.8% with poor blood sugar levels. Based on the results of statistical tests, it is obtained a p-value of 0.030 ($p < 0.05$) indicating that H_o is rejected. Thus, it is concluded that there is a meaningful relationship between knowledge and blood sugar levels.

Respondents with less fiber intake displayed 84.6% had poor blood sugar levels and respondents with adequate fiber intake indicated 17.6% had poor blood sugar levels. Based on the results of statistical tests, it is obtained a p-value of 0.001 ($p < 0.05$). This means that Ho is rejected, so it is concluded that there is a significant relationship between fiber intake and blood sugar levels.

Respondents with less vitamin C intake were 12 (85.7%) with poor blood sugar levels, and respondents with good vitamin C intake were 2 (12.5%) whose poor blood sugar levels. The statistical test results displayed the p-value of 0.000 ($p < 0.05$). This confirms that Ho is rejected showing the relationship between vitamin C intake and blood sugar levels.

There was 10 (83.3%) respondents who had activity inactive physical, not good (high) blood sugar while those who had operation 4 people active physical(22.2%) had bad blood sugar. Statistical test results obtained p-value 0.004 ($p < 0.05$) shows that there is a significant relationship between physical activity with blood sugar levels at the time.

12 (46.2%) respondents who did not adhere to the amount of food consumed had high blood sugar. Statistical test results obtained p-value 1.000 (p> 0,05) indicating that there is no significant relationship between compliance with the amount of food consumed with blood sugar levels.

11 (68.8%) respondents who did not comply with the type of food consumed had high blood sugar. Statistical test results obtained p-value 0.026 (p <0.05) indicating that there is a significant relationship between adherence to the type of food with blood sugar levels.

9 (56.2%) respondents who did not adhere to the meal schedule, have poor blood sugar, while those who were obedient 4 (35.7%) had bad blood sugar. Statistical test results obtained p-value 4.48 (p > 0.05) showed that there was no significant relationship between adherence to the meal schedule and blood sugar levels.

13 (48.1%) respondents who did not comply with their diets, did not have good (high) blood sugar. Statistical test results obtained p-value 1.00 (p > 0.05) showed that there was no significant relationship between dietary compliance with blood sugar levels.

DISCUSSIONS

Based on the results of the study, there was a significant relationship between knowledge and blood sugar levels. This research is also not much different from the results that patients with a good level of knowledge are fully compliant with the DM diet [6]. The results showed that there was a significant relationship between simple carbohydrate intake (sucrose) and blood sugar levels [7]. The consumption of sugar (simple carbohydrates) in excessive amounts encourages the neurotransmitter system to try to find sugar as continuous dopamine (sugar opium) satisfaction [8]. Therefore should the respondents with diabetes mellitus need to control the intake of sugar (sucrose), and use the alternative sugar or sweetening drinks or foods such as sugar diabetes, diabetes honey.

Based on the results of the study, it was found that there was a significant relationship between fiber intake and blood sugar levels confirming the previous research that there is a substantial relationship between fiber intake and blood sugar in patients with type 2 diabetes mellitus [2]. Fiber can improve the response of blood glucose and insulin index. These fibers can inhibit the passage of glucose through the walls of the digestive tract to the blood vessels so that levels in the blood are not excessive. Patients with type 2 diabetes must eat food following the conditions set in their diet therapy so that patients can remain productive because their sugar levels are always controlled within reasonable limits.

The study found that there was a significant relationship between intake of vitamin C and blood sugar levels. For diabetic patients, vitamin C is useful as an antioxidant. Antioxidants are helpful in reducing oxidative damage to prevent complications in patients with type 2 diabetes. Vitamin C helps prevent complications of type 2 DM by inhibiting sorbitol production. Sorbitol is a by-product of sugar metabolism that will be accumulated in cells. It is recommended for people with diabetes to consume a lot of foods containing high levels of vitamin C, including oranges, guava, green peppers, sprouts, and broccoli because high doses of vitamin C can prevent various complications of diabetes [9].

The significant relationship between physical activity with blood sugar levels supports the previous research [10] where the researchers explained if someone with a pattern of mild physical activity can lead to an increase in blood sugar levels in the body.

In contrary, the results showed no significant relationship between adherence to the amount of food consumed with blood sugar levels. Diet management in DM patients is to maintain blood glucose levels so that they are close to normal by balancing food intake with insulin with oral glucose medication and physical activity, achieving and maintaining serum lipid levels, preventing complications, and providing enough energy to keep or produce normal body weight [11]. Under this notion, it is sensible that the patients do not really with the amount of food consumed as long as they can maintain the close to average blood sugar level.

The results further showed that there was a relationship between patient adherence to the type of food consumed with blood sugar levels. Here the role of family is essential to becoming the supervisor to ensure the family members suffering from diabetes adhering to food consumed [11]. The family plays a role in reducing patient ignorance in the face of illness and disobedience caused by temptations from outside [12].

CONCLUSION

The hospital should be able to improve the education program through counseling and nutritional counseling and encourage eating fiber and vitamin C foods as recommended, and motivate patients to be in compliant with the amount and type food consumed as well as the schedule to consume the food. Also, the family members must be motivated to be more active in participating in monitoring food consumed by family members suffering from Diabetes Mellitus. Since the level of compliance is low, it is necessary to conduct further research with different methods to explore what factors cause low levels of compliance.

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REFERENCES

1. Kasmawati H. The characteristic of patients with diabetes mellitus Type 2 in all community health center, City of Kendari, southeast Sulawesi in 2016. International Journal of Green Pharmacy (IJGP). 2018 Feb 11;11(04).
2. Muliani U. Asupan zat-zat gizi dan kadar gula darah penderita dm-tipe2 di poliklinik penyakit dalam RSUD Dr. H. Abdul Moeloek Provinsi Lampung. Jurnal Kesehatan. 2016 Jan 25;4(2).
3. Bintanah S, Handarsari E. Asupan Serat Kadar Gula Darah, kadar Kolesterol Total, dan Status Gizi pada Pasien Diabetes Melitus Tipe 2 di Rumah Sakit Roemani Semarang. Semarang: UNIMUS. 2012.
4. Fatimah RN. Diabetes melitus tipe 2. Jurnal Majority. 2015 Jan 26;4(5).
5. Indriyani P, Supriyatno H, Santoso A. Pengaruh latihan fisik; senam aerobik terhadap penurunan kadar gula darah pada penderita DM tipe 2 di wilayah Puskesmas Bukateja Purbalingga. Nurse Media Journal of Nursing. 2010 Dec 22;1(2).
6. Nakamireto GP. Hubungan pengetahuan diet diabetes mellitus dengan kepatuhan diet pada pasien diabetes mellitus tipe 2 di wilayah kerja Puskesmas Gamping II Sleman Yogyakarta (Doctoral dissertation, STIKES Jenderal A. Yani Yogyakarta).2016.
7. Listiana N, Mulyasari I, Paundrianagari MD. Hubungan asupan karbohidrat sederhana dan aktivitas fisik dengan kadar glukosa darah pada penderita diabetes mellitus tipe 2 wanita usia 45-55 tahun di kelurahan Gedawang kecamatan Banyumanik kota Semarang. Jurnal Gizi dan Kesehatan. 2015;7(13).
8. Mezie-Okoye MM. Diabetes in older adults: experience from a rural community in south-east Nigeria. African Journal of Diabetes Medicine Vol. 2013 Nov 1;21(2).
9. Masoodi H, Kamat TV, Coyaji KJ, Bhat DS, Kumaran K, Yajnik CS. Association of Maternal Vitamin C Status with Gestational Diabetes Mellitus. Journal of Krishna Institute of Medical Sciences (JKIMSU). 2015 Jul 1;4(3).
10. Hemmingsen B, Gimenez-Perez G, Mauricio D, I Figuls MR, Metzendorf MI, Richter B. Diet, physical activity or both for prevention or delay of type 2 diabetes mellitus and its associated complications in people at increased risk of developing type 2 diabetes mellitus. Cochrane Database of Systematic Reviews. 2017(12).
11. Astuti S, Paratmanitya Y, Wahyuningsih W. Tingkat pengetahuan dan dukungan keluarga tidak berhubungan dengan kepatuhan menjalani terapi diet penderita diabetes mellitus tipe 2 di Puskesmas Kasihan II Bantul Yogyakarta. Jurnal Gizi dan Dietetik Indonesia (Indonesian Journal of Nutrition and Dietetics). 2016 Aug 30;3(2):105-12.
12. Baig AA, Benitez A, Quinn MT, Burnet DL. Family interventions to improve diabetes outcomes for adults. Annals of the New York Academy of Sciences. 2015 Sep 1;1353(1):89-112.

Physical Environment of Home Affecting the Infection of Helminthiasis among Toddlers in Rural Areas

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ABSTRACT

Background: Helminthiasis in Indonesia are still public health problems because the prevalence is still very high between 45% -65%. Even in certain areas with poor sanitation, the prevalence can reach 80%. This study aims to determine the relationship between the variables of the physical environment of the house with the incidence of infection of worm eggs in toddlers.

Method: This type of research uses a cross-sectional design. The location of this study was in Sumbang District, Banyumas Regency, Central Java, Indonesia. The size of the research sample was 237 toddlers (age 12 months to <60 months). The process of data analysis uses univariate and bivariate analysis. Chi-Square test was employed to examine the relationship.

Results: The results of this study indicate that there is a correlation between several variables of the physical environment of the house with the incidence of worm infections in the toddler including the home yard cleanliness (p = 0.003), house floor type (p = 0.017), wastewater disposal (p = 0.000) , ownership of healthy latrines (p = 0.042), and house density (p = 0.000).

Conclusion: People can experience improver environmental sanitation conditions where toddlers have daily activities including having healthy latrines and improving access to sanitary restrooms for each family.

***Keywords**-: Home, Physical environment, Helminthiasis, Infection, Toddler*

INTRODUCTION

In the village of Indonesia, worming attacks more children because their activities are more related to the soil where there are a number of species that are transmitted through the soil including roundworms (*Ascaris lumbricoides*), whipworms (*Trichuris trichiura*) and hookworms (*Necator americanus* and *Ancylostoma duodenale*) that infect humans the most [(1)]. Indonesia is one of the endemic countries of *Soil-Transmitted Helminths (STH)* with the third largest number of children aged 1-14 years in the world after India and Nigeria which is around 7% [(2)] as in certain areas with poor sanitation; worm prevalence can reach 80% [(3,4)]. Given this, the approach to prevention of worm disease through the improvement of sound environmental quality and healthy behavior is needed, so that the health risks for humans to be infected with worms can be suppressed.

Research on helminthiasis in rural areas of Central Java Province showed high rates of morbidity due to worms intestine [(5,6)].

Though worm disease is widespread in all rural and urban areas with a high prevalence and has the impact mainly on the quality of human resources, this is still a small concern for the community. Thus, this study aims to determine the relationship between the variables of the physical environment of the house with the incidence of infection with worm eggs in toddlers.

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METHODOLOGY

This type of research was observational with a cross-sectional approach. The location of this study was carried out in Sumbang sub district randomly in one sub-district from five sub-districts under the coverage of Banyumas Regency, Central Java Province.

The population in this study were all to toddlers (aged 12 months to <60 months) in the Banyumas Regency with the number of 237 samples in Sumbang District.

The data collected was then tabulated and analyzed by univariate descriptively from each variable with a frequency distribution table, and bivariate analysis to see the relationship between variables with statistical tests of Chi-square.

RESULTS

The results of the univariate analysis of the house physical environment are summarized in the following table.

Table 1. Frequency Distribution of the House Physical Environment

No	Variables	Category	Total	%
1	Yard	Partially and wholly available	191	80.6
		No yard	46	19.4
		Total	237	100
2	Yard cleanliness	Dirty	125	52.7
		Clean	112	47.3
		Total	237	100
3	Floor type	Partially and wholly covered	137	57.8
		No floor	100	42.2
		Total	237	100
4	Water sources	Vulnerable	145	61.2
		Safe	92	38.8
		Total	237	100
5	Water disposal	Yard/garden	88	37.1
		River/pond	149	62.9
		Total	237	100
6	Sanitary toilet possession	No	203	85.7
		Yes	34	14.3
		Total	237	100
7	House density	< 10 m^2	63	26.6
		> 10 m^2	174	73.4
		Total	237	100

Most houses have yards in the form of soil, rocky and sandy (80.6%) and the rest is yard made from cement as much as 19.4%. The cleanliness of the yard observed from the presence of puddles, garbage, and the absence of sunlight is as much as 52.7% indicating the clean home yard is only 47.3%. The household floor in this study was found as much as 57.8% still made of soil and 42.2% of the floor of the house was made of water-resistant material. Clean water sources are used for everyday purposes in the category of risky as it is taken from river or pond (61.2%) while the one in the class of safe is the source of water taken from dug wells, hand-pumped wells, springs and running water company (38.8%). The study showed that 62.9% of waste water was discharged into rivers/ponds, and 37.1% discharged it in the yard/garden around the house. Ownership of

sanitary latrines is 14.3% while 85.7% do not have ones and to make it worse, still many families that do not have latrines. Average house density is 14.82 m^2 with the category of occupant density <10 m^2 is 26.6%, and house density > 10 m^2 is 73.4%.

Table 2. Cross Tabulation of Physical Environment of The House and Helminthiasis

No	Variables	Category	Helminthiasis in toddlers				Total	
			Positive		Negative			
			Total	%	Total	%	Total	%
1	Yard	Partially and wholly	117	61.26	74	38.74	191	100
		No yard	25	54.35	21	45.65	46	100
		P = 0.391	OR = 1.33; CI (95%) = 0.79-2.54					
2	Yard cleanliness	Dirty	86	68.8	39	31.2	125	100
		Clean	56	50	56	50	100	100
		P = 0.003	OR = 2.205 ; CI (95%) = 1.298-3.744					
3	Floor type	Partially and wholly	91	66.42	46	33.58	137	100
		No floor	51	51	49	49	100	100
		P = 0.017	OR = 1.90 ; CI (95%) = 1.12-3.335					
4	Water sources	Vulnerable	86	59.31	59	40.69	145	100
		Safe	56	60.87	36	39.13	92	100
		P = 0.811	OR = 0.940 ; CI (95%) = 0.55-1.60					
5	Water disposal	Yard/ garden	78	88.64	10	11.36	88	100
		River/ pond	64	42.95	85	57.05	149	100
		P = 0.000	OR = 10.359 ; CI (95%) = 4.973-21.581					
6	Sanitary toilet possession	No	127	62.56	76	37.44	203	100
		Yes	15	44.12	19	55.88	34	100
		P = 0.042	OR = 2.117 ; CI (95%) = 1.016-4.411					
7	House density	< 10 m^2	48	76.19	15	23.81	63	100
		> 10 m^2	94	54.02	80	45.98	174	100
		P = 0.002	OR = 2.723 ; CI (95%) = 1.419-5.227					

The statistical test results for yard type obtained p = 0.391 indicating there is no difference in the proportion of toddler positively infected by worm eggs between houses that are partially or wholly having a yard or no yard. The results of statistical tests for yard cleanliness obtained p = 0.003 denoting there is a difference in the proportion of incidence toddler positive of worm egg infection between homes that do not clean the yard and a house with a clean yard. Oddity Value Ratio (OR) = 2.205 means that the dirty house has a chance of 2.205 times for toddlers to be infected by worm's eggs compared to the home with a clean yard. Similarly, a positive relationship is found between floor types of the house with the incidence of infection of worm's eggs in the toddler with the OR = 1.90. The same trends also found in waste water disposal with OR = 10,359, sanitary latrine ownership with OR = 2.117, and house density with OR = 2.723. However, statistical test results for the water source obtained p = 0.811 meaning that there is no difference between the proportion of homes that have vulnerable water sources to the homes that have safe water sources.

DISCUSSIONS

Based on statistical tests on the variables of the physical environment of the house, seven variables allegedly related to the incidence of infection of the eggs flatulent there were five variables that were statistically significant, namely the cleanliness of the yard, type of floor of the house, ownership of sanitary latrines , disposal of liquid waste and density of homes. This is possible because the family's habit of defecating (toddler and family) is not in the toilet and has an impact on the presence of worm eggs on the ground, as a result of not having sanitary latrines as well as house density.

In planning to make latrines, attention must be paid to efforts to prevent breeding. The nature of positive phototropic flies, which are attracted to light and avoid darkness and dark surfaces, can be used for prevention efforts. The best latrine is a toilet where the fist immediately flushes into a hole or underground tank. Besides, all parts that are open to feces, including seating or squatting, must be kept clean and closed if not used [7].

The existence of worm eggs on the ground is more optimal if the atmosphere of the surrounding environment is conducive to support. This happens as the yard is poorly maintained and the disposal of liquid waste is still to the yard/garden. Wastewater disposal facilities must meet the requirements of not contaminating drinking water sources, not contaminating surface water, not infecting disease-causing insects, closed, odorless and having disposal at the end of the channel [8]. Water can be a significant factor in various diseases such as *typhus, dysentery*, diarrhea, cholera, and worms [9].

While the type of floor houses are still made from the soil extending worm breeding ground, thus increasing the contact of toddlers with contaminated soil worm eggs. Floor requirements of a clean house have a type of floor that is not dusty in the dry season and not wet in the rainy season. The kind of floor of the house that meets the requirements, namely: (1) plastered, tile, ceramic, board, or stilt house, (2) not dusty, and (3) kept clean. The type of floor of the house from the soil can cause worm disease because the ground is a factor in the spread of the disease [10].

Several supporting studies [11, 12] show that the condition of home sanitation (water source, water quality, the place to wash hands and cutlery, bowel movements, house floor, and house density) are related to the incidence of helminthiasis. Also, poor sanitation conditions can worsen the prevalence of worm egg infection.

House density allows facilitating pollution and decreasing the ratio between the number of occupants and home sanitation facilities so that it supports the possibility of infection with worm eggs. Further, other environmental variables exacerbate soil pollution conditions making worm eggs will be more optimal in the soil which then provides an excellent opportunity for the infection of worm eggs in a toddler which is also supported by habits that are not good from the toddler and mother. Efforts need to be made to improve the physical environment of the house in general and to counsel on the prevention of worm disease.

CONCLUSION

For the community, it is expected to maintain the cleanliness of the surrounding house yard that is used to play toddlers and repair the floor of the house by using waterproof flooring material to reduce the risk of infection with worm eggs in a toddler in the home. Also, the community must make a means of storing wastewater that is closed and safe for the environment and does not pollute the environment. And the most important thing is for every family to have and be able to access a sanitary latrine to secure their dirt so as not to pollute the environment and not cause infection with worm eggs.

Ethical Clearance: Ethical clearance was obtained from The Ministry of Health Polytechnic Semarang, Indonesia. We also wish to thank all the participants who contributed to this study.

Conflict of Interest: Nil.

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REFERENCES

1. Anwar C, Annisa S, Dalilah D, Novrikasari N. The Relationship Between Soil Transmitted Helminthes (STH) Infection and Nutritional Status in Students of State Elementary School Number (SDN) 200 Palembang Indonesia. BioScientia Medicina. 2018 Apr 12;2(2):42-53.
2. Tan M, Kusriastuti R, Savioli L, Hotez PJ. Indonesia: an emerging market economy beset by neglected tropical diseases (NTDs). PLoS neglected tropical

diseases. 2014 Feb 27;8(2):e2449.

3. Hamid F, Versteeg SA, Wiria AE, Wammes LJ, Wahyuni S, Supali T, Sartono E, van Ree R, Yazdanbakhsh M. Molecular diagnostics and lack of clinical allergy in helminth-endemic areas in Indonesia. Journal of Allergy and Clinical Immunology. 2017 Oct 1;140(4):1196-9.
4. Hamid F. 6 molecular diagnostics in a helminth-endemic area in Indonesia provides leads. Helminth infections, socio-economic status and allergies in Indonesia. 2015:107..
5. Park MJ, Laksono B, Clements A, Sadler R, Stewart D. Worm-free children: an integrated approach to reduction of soil-transmitted helminth infections in Central Java. Reviews on environmental health. 2016 Mar 1;31(1):111-3.
6. Sofiana L, Kelen MS. Factors Related to Soil Transmitted Helminth Infection on Primary School Children. Unnes Journal of Public Health. 2018 Jan 31;7(1).
7. Soeparman HM, Suparmin. Pembuangan tinja & limbah cair: suatu pengantar. Penerbit Buku Kedokteran EGC; 2001.
8. Notoatmodjo S. Kesehatan masyarakat. Jakarta: Rineka Cipta. 2007.
9. Sutrisno CT. Teknologi penyediaan air bersih. Rineka Cipta; 2010.
10. Margono SS, Ismid IS, Sukardi W. Cacing yang Ditularkan Melalui Tanah pada Anak Sekolah Dasar di Sekitar Klinik Sanitasi di Lombok Timur, Nusa Tenggara Barat. Sari Pediatri. 2016 Dec 6;2(4):188-92.
11. Islamudin RA, Suwandono A, Saraswati LD, Martini M. Gambaran Perilaku Personal Hygiene yang Berhubungan dengan Infeksi Soil Trasmitted Helminth pada Anak Sekolah Dasar (Studi Kasus di Desa Candi Kecamatan Bandungan Kabupaten Semarang). Jurnal Kesehatan Masyarakat (e-Journal). 2017 Jan 15;5(1):212-7.
12. Safitri SD, Nofita E, Pertiwi D. Faktor yang berhubungan dengan kejadian Ascariasis pada murid SD 27 Olo Kota Padang. Jurnal Kesehatan Andalas. 2017 Oct 12;6(2):253-8.

Knowledge and Attitudes of Academic Instructor Toward First Aid at the Technical Institute-Suwaira

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ABSTRACT

Objective(s): To assess the level of knowledge and attitude of academic Instructor toward first aid and to identify the relationship between the level of knowledge and attitudes of academic Instructor toward first aid and their socio demographic characteristic.

Material and Method: A descriptive study design was carried out to assess the level of knowledge and attitude of academic Instructor toward first aid and to identify the association between the level of knowledge and attitudes of academic Instructor toward first aid and their socio demographic characteristic. The study was started from March 5th, 2018 to September 4th, 2018. The sample was Non - probability (purposive) sample of (50) academic Instructor are selected according to the criteria of the study and its purpose who working Technical Institute-Suwaira. The study was approved by the Center Ethical Committee. The data were collected by direct interview using specific questionnaire. Data was analyzed by (SPSS) package version 20. **Descriptive data** used to describe study variable: frequencies, percentages and mean of score. **Inferential statistical data analysis approach:** used by application of the **Chi –square test** used for determining the association between Socio-demographic characteristics and knowledge, attitude. Testing the significant of the contingency coefficient for this study the significant P-value ≤ 0.05.

Findings: (28%) from them were 40-49 years old, (78%) were male, (88%) were married, the overall level of knowledge was poor (66%), highly statistical significant association between items which is related to knowledge and academic Instructor' educational level and highly statistical significant association between items which is related to attitudes and academic Instructor' department.

Recommendations: The study recommends that Academic Instructor need regular training about first aid. Establish of mandatory courses for academic Instructor on first aid and attention for quality of this courses and provide first aid box at each department and classrooms.

Keywords: *Knowledge, Attitude, Academic Instructor, First aid, Technical Institute*

INTRODUCTION

Sudden illnesses and injuries are an essential issue in public health and usually occurring at any times of daily life [(1)].

Accidental injuries are usually categorized based on their happening, for example: poisoning, burns, drowning and falls ,…etc [(2)].

First aid is an urgent attention delivered to victims of injury until medical helps arrive. Early procedures of such emergencies decreases morbidity and deaths [(3)].

Healthy environment is very vital to avoid these hazards besides competent teachers who can identify any health problem and able to provide first aid for commonly happening emergencies [(4)].

Primary purpose of first aid to reduce suffering, make healing process possible and decrease damage. First action taken to deal with injuries and sudden

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illnesses decide the upcoming sequences of illness and complication rates [5].

National First aid Science Advisory Board clarified, everybody can and must learn first aid, i.e. education and training in first aid should be worldwide. This is recognized by the fact that correctly directed first aid means the difference among life and death, early versus late rescue, and momentary versus long-lasting disability [6].

Teachers must know the basic rules for first aid and the students must be instructed on first aid [7].

First aid is complex and specific situation, so that more informed and better trained, first aid are more eligible to deal with unexpected sudden injury [8].

Identification of urgent situation and calling for help is an important issue in first aid, particularly in case of lack or insufficient basic knowledge about first aid measures for complex situations to be sure that the students will have a professional medical help [9].

Thus first aid must be medically sound and based on scientific knowledge, and when the knowledge is absence, consult the expert. First aid can be obtained by everyone and comprises self-care, first aider can be any person exist in the scene of emergency and provides such care like parents, teachers, policeman, fireman, first responder and professional medic, etc [10].

There are three main objectives for first aid, firstly: preserve life, not merely life of victims, but first aider's life as well. Because if first aiders put their life in danger might ends up struggling for his own life instead of the victim. Secondly: avoid worsening of condition. Thirdly: encourage recovery, which means first aider actions should assist injured person toward improvement, certainly after preventing situation from getting worse[11].

MATERIAL AND METHOD

A descriptive study design was carried out to assess the level of knowledge and attitude of academic Instructor toward first aid and to identify the association between the level of knowledge and attitudes of academic Instructor toward first aid and their socio demographic characteristic. The study was started from March 5th, 2018 to September 4th, 2018. The sample was Non - probability (purposive) sample of (50) academic Instructor are selected according to the criteria of the study and its purpose who working Technical Institute-Suwaira. The study was approved by the Center Ethical Committee. Content validity for the early develops instrument is determine through a panel of (7) experts who have more than 5 years of experience in their specialties to review the questionnaire clarity, relevance, and adequacy. The determination of reliability of the questionnaire is base on Split-half reliability; the correlation coefficient is (0.817).The data were collected by direct interview using specific questionnaire that composed of three parts (28) items which: **Part (1)** Socio-demographic characteristics were included (8) items (age, gender, marital status, department, educational level, scientific title, get information about first aid, experience of teaching). **Part (2)** which dealing with knowledge about first aid including (10) items and **Part (3)** which dealing with attitude about first aid including (10) items.

Data was analyzed by (SPSS) package version 20. **Descriptive data** used to describe study variable: frequencies, percentages and mean of score. **Inferential statistical data analysis approach:** used by application of the **Chi –square test** used for determining the association between Socio-demographic characteristics and knowledge, attitude. Testing the significant of the contingency coefficient for this study the significant P-value ≤ 0.05[12].

$\leq$ = Equal or Less than

FINDINGS

Table (1): Distribution of the study sample according to Socio-Demographic characteristics of academic Instructor

Age	**F.**	**%**	**Department**	**F.**	**%**
20-29	7	14%	Technical Nursing	9	18%
30-39	13	26%	Technical Computer system	3	6%
40-49	14	28%	Technical Machinery and equipment	8	16%
50-59	4	8%	Technical Accounting	12	24%
60- and more	12	24%	Technical Electrical	7	14%
Total	50	100%	Technical Plant production	6	12%
			Technical Mechanical Technology	5	10%
			Total	50	100%
Gender	F.	%	Marital status	F.	%
Male	39	78%	Single	6	12%
Female	11	22%	Married	44	88%
Total	50	100%	Total	50	100%
Education level	F.	%	Scientific title	F.	%
Bachelor	7	14%	assistant lecturer	31	62%
Master	34	68%	Lecturer	16	32%
Doctorate	9	18%	assistant professor	3	6%
Total	50	100%	Total	50	100%
Information about first aid	F.	%	Experience	F.	%
Yes	28	56%	1-10 years	22	44%
No	22	44%	11-20 years	14	28%
Total	50	100%	21-30 years	8	16%
			31 years -and more	6	12%
			Total	50	100%

F = Frequency, % = Percentage.

Results out of this table reveal the socio-demographic characteristic of (50) academic Instructor(28%) from them were 40-49 years old, (78%) were male, (88%) were married, (24%) from technical accounting department , (68%) were master degree, (62%) scientific title of them were assistant lecturer , (44%) the experience of them were 1-10 years, (56%) of them have information about first aid.

Table (2): Assess the level of knowledge to academic Instructor about first aid

Knowledge			
Level	M.S	F.	%
Poor	1 - 1.66	33	66%
Immediate	**1.67 - 2.33**	11	22%
Good	**2.34 – 3**	6	12%
Total	**1 – 3**	**50**	**100%**

F = Frequency, % = Percentage, M.S = mean of the score.

Results out of this table indicate that the overall level of knowledge was poor.

Table (3): Assess the level of attitudes to academic Instructor about first aid

Attitudes	M.S	F.	%
Negative	1 - < 1.5	30	60%
Positive	**≥ 1.5 – 3**	20	40%
Total	**1-3**	**50**	**100%**

F = Frequency, % = Percentage, M.S = mean of the score.

Results out of this table indicate that the overall level of attitudes was negative.

Table (4): Association between the Knowledge, Attitudes and Socio- Demographic characteristics of Academic Instructor

Socio-Demographic characteristics	Knowledge		Attitudes	
	P-value	C.S	P-value	C.S
Age	0.10	NS	0.08	NS
Gender	**0.03**	**S**	0.42	NS
Marital status	0.47	NS	0.78	NS
Department	0.50	NS	**0.000**	HS
Educational level	**0.009**	**HS**	0.33	NS
Scientific title	**0.06**	NS	**0.01**	**HS**
Get information about first aid	**0.000**	**HS**	0.26	NS
Experience of teaching	0.49	NS	0.35	NS

P: probability level, S: Significant at P< 0.05, HS: Highly Significant at P< 0.05, NS: Non-significant at P > 0.05, C.S: Comparative Significant

Results out of this table reveal highly statistical significant association between items which is related to knowledge and academic Instructor' educational level and get information about first aid, and highly statistical significant association between items which is related to attitudes and academic Instructor' department and scientific title

DISCUSSION

1: Socio-demographic characteristic of academic Instructor

In regard to socio-demographic characteristic of (50) academic Instructor according to age, the most (28%) were 40-49 years old; this result is agreed in this study [13],

which reported that majority of participants were above 40 years of age. (78%) male were the dominant gender. (88%) were married; this result is agreed in this study [14], that higher proportion of participants were married (more than four-fifth of participants) , in addition, about 79.8% of teachers had children which reflects the nature of Iraqi society and its traditions, especially as confirmed by statistics of the Central Organization for Statistics of the Ministry of Planning. (24%) from technical accounting department. Educational level (68%) were master degree, (62%) scientific title of them were assistant lecturer; because the most of participants were have master degree. (44%) the experience of them were 1-10 years. (56%) of them have information about first aid; this result is agreed in this study [14] [table 1].

2: Discussion of the knowledge of academic Instructor about first aid

The results of this table revealed that the overall level of knowledge was poor (66%), because the most of academic Instructor have information about first aid but this information is incorrect and not in standard level; this result is agreed in this study [15] , of the 100 participants, 4% had good knowledge, 19% had fair knowledge and 77% had poor knowledge [table 2].

3: Discussion of the attitudes of academic Instructor about first aid

The results of this table revealed that the overall level of attitudes was negative(60%), because when the information about first aid is incorrect that lead to the attitudes toward negative and the academic Instructor don't participate in first aid courses to learn practice at good way; this result is not agreed in this study [14] , the present study found that overall attitude of vast majority of teachers was positive [table 3].

4: Discussion of the Association between socio-demographic characteristic of academic Instructor and their knowledge and attitudes

The results of the present study reveal that statistical significant association between the knowledge with gender; this result is agreed in this study [16], there is a significant difference between male and female ($p = .001$). While shows highly statistical significant association between the knowledge with educational level and information about first aid; in front of researcher view this is because the educational level effect the knowledge and most of academic Instructor have high level education (master degree) and while shows highly statistical significant association between the knowledge with information about first aid; this result is agreed in this study [16], there is a significant difference in information about first aid ($p = .014$) [table 4].

The findings of the present study shows that highly statistical significant association between attitudes with department; in front of researcher view this is because the some department give information about first aid to lecturer to deal with accident happened in training procedure and while shows highly statistical significant association between the attitudes with scientific title; in front of researcher view this is because associate with educational level of participants.

CONCLUSION

The most age of academic Instructor 28% in 40-49 , 68% from them level of education was master , (56%) of them have information about first aid, the academic Instructor with poor level of knowledge about first aid, there is significant association between training and knowledge and significant association between gender and knowledge of academic Instructor about first aid.

Recommendations:

The study recommends that:

1. Academic Instructor need regular training about first aid.
2. Add first aid training to the curriculum of the institute.
3. Establish of mandatory courses for academic Instructor on first aid and attention for quality of this courses.
4. provide first aid box at each department and classrooms.

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REFERENCES

1. Salminen S, Kurenniemi M, Raback M, Markkula J. and Lounamaa A. 'School environment and school injuries', Front Public Health 2014 ; 1(January),:p. 76.

2. WHO Children ' s Health and the Environment Unintentional Childhood Injuries 2010.
3. Khatatbeh M. 'First Aid Knowledge Among University Students in Jordan', International Journal of Preventive Medicine 2016; 7(24);pp. 1–5.
4. Masih S, Sharma K, and Kumar A.'Knowledge and practice of primary school teachers about first aid management of selected minor injuries among children'. International Journal of Medicine and Public Health 2014; 4(4): pp. 458–462.
5. Goel S. and Singh A. 'Comparative Impact of Two Training Packages on Awareness and Practices of First Aid for Injuries and Common Illnesses among High School Students in India.' International Electronic Journal of Health Education. ERIC 2008; 11(2): pp. 69–80.
6. The National First-Aid Advisory Board.Evidence based First Aid Guidelines-Report of the US National First Aid science Advisory Board. 2005.
7. Celik, S. 'A media comparison study on first aid instruction', Health Education Journal 2013; 72(1): pp. 95–101.
8. Saubers N. and Iannelli, V. The Everything First Aid Book. 1st edn. Avon, Massachusetts: Adams Media an F+W Publications Company 2008.
9. Cowan M. K, Gross M, Kaiser L. M, Hatton D. C, Westley C. and Fletcher K. R. 'Health risks across the life span', Foundations of nursing in the community: Community-oriented practice 2010; pp. 350–383.
10. Singletary E. M, Charlton N. P, Epstein J. L, Ferguson J. D, Jensen J. L, MacPherson A. I et al. 'Part 15: First aid: 2015 American Heart Association and American red cross guidelines update for first aid', Circulation 2015 ; 132(18):pp. 574–589.
11. Barraclough, N. First aid made easy, A comprehensive first aid manual and reference guide (2015). 10th edn. Qualsafe Limited.
12. Polit, D. hungler B. Principles and Method, Nursing Research 2012;6(1): pp. 418.
13. Kumar S. D, Kulkarni P, Srinivas N, Prakash B, Hugara S. and Ashok N. C. 'Perception and practices regarding first-aid among school teachers in Mysore', Natl J Community Med 2013; 4(2): pp. 349–352.
14. Hussein M. ' Knowledge and attitudes of primary school teachers toward first aid at Al-Najaf City' master thesis, 2016; pp. 81.
15. Al-Robaiaay, Y. K. H. 'Knowledge of Primary School Teachers Regarding First Aid In Baghdad Al-Rusafa', Al – Kindy Col Med J 2013; 9(1): pp. 56.
16. Nawaf R., Mohammad Q. ' General Knowledge & Attitude of First Aid among Schoolteacher's in Palestine' International Journal of Innovative Research in Medical Science (IJIRMS) 2017; 2(4); pp. 662.

The Effects Lactobacillus Crispatus Probiotics on Proliferation and Metastasis of Cervical Cancer Cell Line using 3D Cell Culture

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ABSTRACT

Objective: Probiotics has been tried as an adjuvant therapy for malignant tumors through their abilities to modulate intestinal microbiota, host immune response and gene expression. Further, there are emerging data supporting the role of probiotic lactic acid bacteria in prevention of early stages colon cancer development but data on their effect on advanced colorectal cancer and cervical cancer are limited. Therefore, the aim of this study was to evaluate the impact of lactobacillus crispatus supernatant (LCS) on the human cervical cell lines (HeLa) proliferation and metastasis.

Materials and Method: Effects of *Lactobacillus* supernatant on cell invasion in vitro was assessed by Transwell migration and invasion assays (3-D culture). The cytotoxic activity of *Lactobacillus crispatus* supernatant were determined by MTT assay and compared to controls, De Man Rogosa Sharpe (MRS) media and MRS + lactic acid groups. Expression of Matrix Metalloproteinase-2 (MMP2) and -9 (MMP9) genes was performed by quantitative reverse transcriptase-polymerase chain reaction (qRT-PCR) following the cell synchronization.

Results: *Lactobacillus crispatus* supernatant had cytotoxic and anti-metastatic effect on HeLa but not on normal cells. Down-regulation of MMP2 and MMP9 genes expression was also observed post-LCS treatment as compared to controls, De Man Rogosa Sharpe (MRS) media and MRS + lactic acid groups ($P < 0.05$).

Conclusion: Lactobacillus crispatus Supernatant could be a potential therapeutic agent for the treatment of advanced human cervical cancer through cytotoxic and anti-metastatic mechanisms

Keywords: *Cervical cancer, Lactobacillus crispatus supernatant, Cell Line, Metastasis.*

INTRODUCTION

Probiotics are defined as live bacteria (microorganisms) that provide health benefits to the human body when consumed and may reduce potentially harmful bacteria in the intestine [1]. Probiotics are used by women in the perinatal period and may improve balance of microbiota with possible health benefits for both mother and baby. Not only probiotics play an important role in immunological, digestive and respiratory functions, but they could have a significant effect on the alleviation of infectious diseases in children and other high-risk groups[2]. Most probiotics belong to the genus *Lactobacillus* which are part of the normal flora in healthy human vagina and have an important function in protecting the host from urogenital infections[3]. Further, probiotic bacteria have shown anti-tumor activities, leading to cancer risk reduction, by several mechanisms including production of anti-mutagenic compounds and degradation of carcinogenic compounds[4].

Cervical cancer is the most frequently diagnosed cancer among women in developing countries and the second most frequent cancer affecting women worldwide[5]. There is considerable evidence supporting the potential role of probiotic lactic acid bacteria (LAB)

in prevention of early stages colon cancer development but data on their role in advanced stages of colorectal cancer and cervical cancer and specifically on metastasis are limited. Tissue invasion and metastasis is dependent on cell invasion through the extracellular matrix (ECM) and involves matrix metalloproteinase (MMPs) that degrade the ECM during the metastatic process[6]. Human Papilloma Virus (HPV) infection is a well-established risk factor for cervical cancer. However, HPV infection, environmental and host factor such as in vivo microbial environment collectively contribute for the pathogenesis of cervical cancer[7]. Several lactobacillus species produce compounds that kill or inhibit the growth of vaginally acquired pathogens[8].

Lactobacillus crispatus (*L. crispatus*) and Lactobacillus rhamnosus (*L. rhamnosus*) are among the most abundant species in healthy women's vagina[9]. In addition, an inhibitory effect for probiotics on colorectal carcinogenesis was observed but there are limited data regarding their prophylactic capacity in the final stages of colorectal cancer, specifically in metastasis. That study has that cell-free supernatants (CFS) from two type of probiotics (L.casei and L.rhamnosus) inhibit colon cancer cell invasion by influencing MMP9 activity in cultured metastatic human colorectal carcinoma cell and the treatment with (CFS) from both lactobacillus species decrease MMP9 and colorectal cell invasion[10]. Therefore, the aim of this study was to evaluate the impact of lactobacillus crispatus supernatant (LCS) on the human cervical cell lines (HeLa) proliferation and metastasis.

MATERIAL AND METHOD

Cell culture

In this experimental work, human cervical cancer cell line (HeLa), were purchased from Pasture Institute, National Cell Bank of Iran. The cells were cultured for 24 hours in Roswell Park Memorial Institute (RPMI) medium containing 10% fetal bovine serum (FBS), and 1% penicillin/streptomycin (all provided from Invitrogen, USA) in a humidified 37˚C atmosphere containing 5% CO2.

Lactobacillus supernatant preparation

De Man Rogosa Sharpe (MRS) broth (pH=6.5, Merck, Germany) was used to grow *L. crispatus* strain SJ-3C-US at 37˚C for 24 hours under microaerophilic conditions. Bacterial cultures (2×10^8c.f.u./ml), which have been incubated for overnight, were centrifuged at 7000 rpm for 7 minutes. To remove remaining bacteria and debris the lactobacilli supernatants (LS) were filtered through a 0.2 mm membrane filter. In order to differentiate the effect of lactate produced by *L. crispatus* supernatant (LCS) with pH change impact, the pH in MRS (6.5) broth was adjusted to pH in LS (4.2 ± 0.1) with lactate, this control is called MRS. In this experiment, the following conditions were tested: LCS, pH=4.2; MRS, pH=6.5; in HeLa cells[4].

Migration/invasion assay (3-D culture)

Migration assays were performed in24-well Falcon tissue culture plate with non-coated membrane Transwells (pore size, 8.0 μm, Merck Millipore)[11]. The migration and invasion abilities cells in four groups: HeLa cells without any treatment (group 1), treated by Lactobacillus supernatant (group 2), MRS media (group 3); MRS and HCL (group 4) for 12 h were assessed using the Transwell assay. Subsequently, cells were stained with crystal violet solution, and the numbers of cells that migrated were quantified by counting the cells in 3 fields under a phase-contrast microscope

Cell synchronization for RNA extraction

HeLa cells were seeded in RPMI medium containing 10% FBS, and 1% penicillin/streptomycin for 24 hours. Subsequently, each cell line was counted and equal number of the cells were sub-cultured in four 25-cm3 flasks and synchronized, three of which were selected to be treated with LS, MRS and MRS+ lactic acid (HCL) for 4 hours. The last flask was used as control, without any treatment[4].

RNA isolation, cDNA synthesis and quantitative reverse transcriptase-polymerase chain reaction

These were performed according to method descried by **Nouri et. al., 2015[4]**

Table1. Sequence of the primers applied for qRT-PCR used in this study

Primer	Primer sequences	Product size (bp)	References
MMP2	**F**: GGCAGTGCAATACCTGAACACC **R**: GTCTGGGGCAGTCCAAAGAACT	111	[12]
MMP9	**F**: GCACGACGTCTTCCAGTACC **R**: CAGGATGTCATAGGTCACGTAGC	124	[13]

Statistical analysis:

Statistical analysis was performed using ImageJ software (NIH, USA). Data were expressed as mean ± SD or proportions and ANOVA test was used to compare mean among groups. $P < 0.05$ was considered as statistically significant

RESULTS

Effects of *Lactobacillus* supernatant on cell invasion in vitro

Figure 1 shows the effects of *Lactobacillus* supernatant on cell invasion in vitro in HeLa cells without any treatment(A), treated by Lactobacillus supernatant (B), MRS media (C), MRS and HCL (D). *Lactobacillus* supernatant suppressed HeLa invasion abilities more than MRS and lactic acid (HCL) individually.

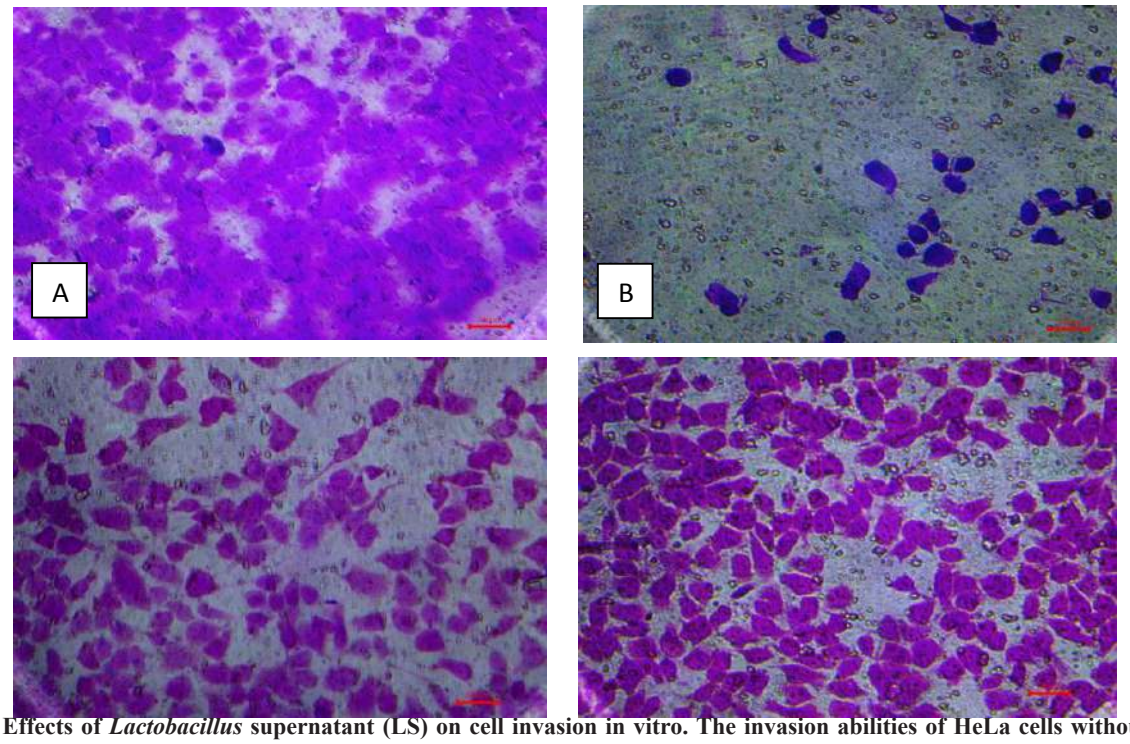

Figure1: Effects of *Lactobacillus* supernatant (LS) on cell invasion in vitro. The invasion abilities of HeLa cells without any treatment (A) and treated by *Lactobacillus* supernatant (B), MRS media (C), MRS and lactic acid (HCL) (D) for 12 h were assessed using the Transwell assay. LS suppressed HeLa invasion abilities more than MRS and lactic acid (HCL) individually.

Invasion percent of HeLa cell by MRS, MRS+HCL and LCS are demonstrated in figure 2. Invasion inhibition of HeLa cell was higher for *Lactobacillus* supernatant as compared to controls, MRS and MRS+ lactic acid (HCL) groups ($P<0.05$).

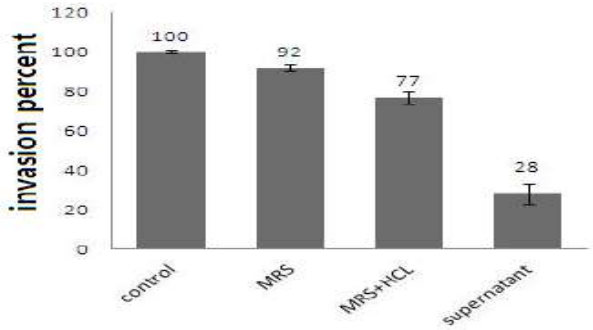

Figure 2: Graph of Invasion percent of HeLa cell by MRS, MRS+HCL and LCS. Invasion inhibition of HeLa cell was higher for *Lactobacillus* supernatant as compared to controls, MRS and MRS+ lactic acid (HCL) groups (P<0.05) MRS, MRL and LCS.

The cytotoxic effect of ***L.crispatus*** strain SJ-3C-US culture supernatant on HeLa cell growth

Lactobacillus supernatant had a significant cell growth inhibitory effect on HeLa cell growth in comparison with the cells treated with MRS solutions indicating that the acidity was not the main cause of HeLa cell growth inhibition. In addition, the IC50 value of LCS against HeLa cells was 11% (v/v), suggesting that a substance, other than lactate, in LCS could only affect the cervical tumor cells (HeLa) but not the normal cells (Fig3).

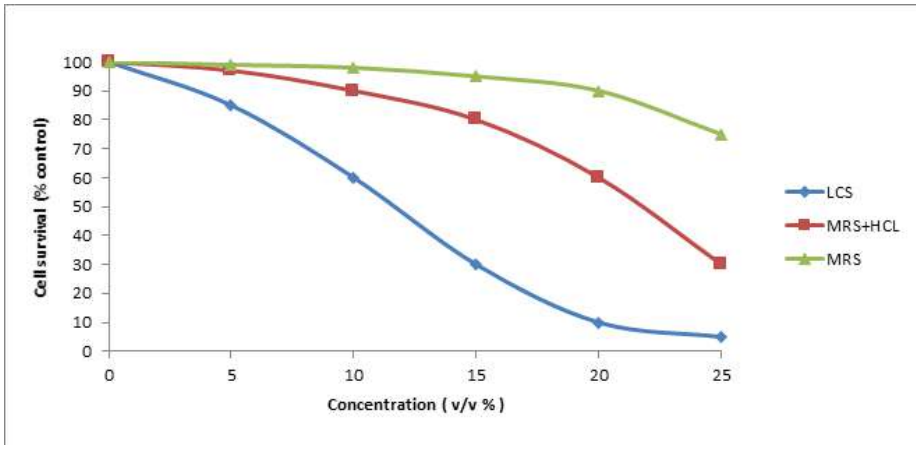

Figure3: Cytotoxicity effects of LCS, MRS+ lactic acid (HCL) and MRS with different concentrations on HeLa cell line measured by MTT assay. The mean value is represented with three separate experiments for each point. MRS, MRS+HCL and LCS.

MMP2 and MMP9 genes expression in HeLa cells treated with LCS

mRNA expression levels of *MMP2 and MMP9 genes* were quantified by qRT-PCR after 4 hours treatment with LCS, MRL or MRS are shown in figure 4. mRNA level of *MMP2 and MMP9 genes* were down-regulated in the HeLa cells treated with LCS, compared to those cells treated with MRS+HCL or MRS. LCS, MRS+HCL and MRS for MMP2 (* $P < 0.05$), while for MMP9 the LCS is significantly deferent from the other 2 group, so there was no statistically significant deference between MRS+HCL and MRS in MMP9.

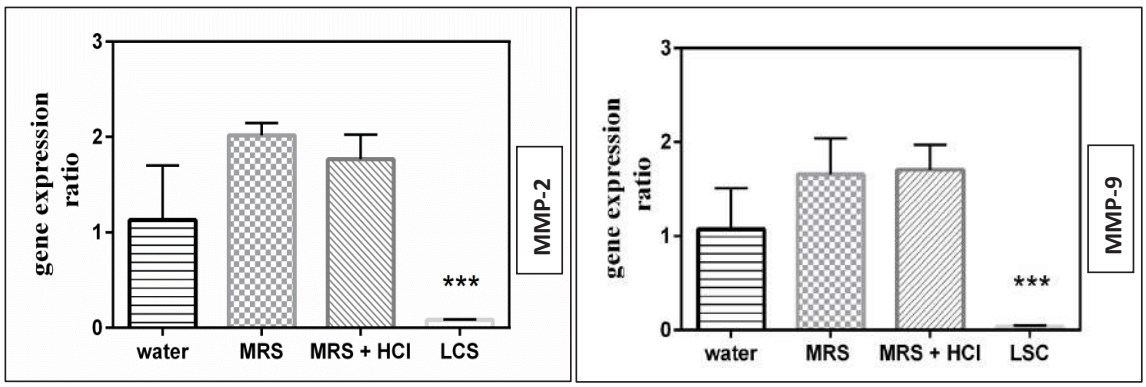

Figure 4: The effect of lactobacilli supernatant on mRNA expression level of MMP-2and MMP-9 genes in the treated HeLa cells with LCS, MRS and MRS+HCL *; P<0.05, MRS; De Man Rogosa Sharpe, MRS+HCL and LCS; *Lactobacillus crispatus* supernatant.**

DISCUSSION

It has been proven that probiotics could play anti-cancer roles by presenting several mechanisms, including induction of immune responses as well as anti-proliferative, anti-apoptotic or anti-microbial activities. Evidences shown that cervical cancer cells could reach to the other organs such as liver, lung and brain[14,15] by activating MMP2 and MMP9 and subsequently degradation of the ECM[16]. In this study, different in vitro procedures were used to characterize the antagonistic and anticancer properties of vaginal *L. acidophilus* 36YL strain. This strain revealed the inhibition of the growth of potential human pathogens and other undesirable bacteria. The results showed that this strain can be considered as a probiotic that possesses the best antagonistic and anticancer properties[17].

Previously we proved that *lactobacilli* culture supernatants caused valuable cytotoxic effect on cervical cancer cells[18].In this study, we have examined the effects of *L. crispatus* culture supernatant treatment on HeLa and MRC-5 cell growth, using MTT assay and transcriptional analysis of some metastatic genes including MMP-2, MMP-9 genes and relevant inhibitors. We specified down-regulation of MMP2 and MMP9 genes expression in HeLa cell lines by treatment with LCS, submitting the inhibitory effect of this probiotic on cervical cell line. In accordance with our findings, *L. crispatus* were previously shown to have an inhibitory effect onMMP2 and MMP9 enzymatic activity[10].In this study LCS indicated anti-proliferative effect on HeLa cell growth. Previously reported results[18]. Thus far, several studies marked that probiotic lactic acid bacteria, including *L. acidophilus, L. casei, and L. rhamnosus* supernatants, are able to prevent colorectal cancer progressions[19,20]. Stimulating autophagy pathway is the other proposed anti-proliferative mechanism of probiotics while as we shown several genes with crucial autophagy roles were down-regulated in HeLa cells, due to treatment with LCS or LRS[21]. A recent study has examined *L. acidophilus* 36YL strain metabolites secretion on different cancerous cell lines including HeLa, AGS and HT-29 compared to the normal cells (HUVEC). The metabolites of these bacteria reduced viability in all of the cancerous cell lines with no toxic effect on the normal cells[17]. A study on the effect of LS on HeLa revealed that downregulation of CASP3 rather than lactate acidity plays a critical roles in cytotoxicity against HeLa [18]. Another study, however, reported that probiotic activity is induced by alteration of pH of culture[22]. Interestingly, MRS+HCL showed a more potent inhibiting effect on cell lines than MRS despite having similar pH. Therefore, our study findings point to altered lactate production irrespective of pH range suggesting that lactate production is a crucial and independent inhibitory factor for cancerous cells.

CONCLUSION

Probiotics include the major normal flora of cervix. It can open a new way toward prevention or even suppression of cervical cancer cell invasions. Further investigations are required to focus on supernatant fraction and assess the effect of these fractions on different cancer cells. *L.crispatus* inhibits proliferation of HeLa cervical cancer cells. The underlying mechanism is unknown but could be partially attributed to down-regulation of HPV oncogenes. Our study findings suggest that lactobacillus is a potential therapeutic agent for the treatment of cervical cancer. Further studies are warranted to consolidate the evidence provided by this study.

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REFERENCES

(1) Hill, C.; Guarner, F.; Reid, G.; Gibson, G. R.; Merenstein, D. J.; Pot, B.; Morelli, L.; Canani, R. B.; Flint, H. J.; Salminen, S.: Expert consensus document: The International Scientific Association for Probiotics and Prebiotics consensus statement on the scope and appropriate use of the term probiotic. Nature reviews Gastroenterology & hepatology 2014, 11, 506-514.

(2) Food; Organization, A.; Organization, W. H.: Probiotics in food: health and nutritional properties and guidelines for evaluation; FAO, 2006.

(3) McLEAN, N. W.; Rosenstein, I. J.: Characterisation and selection of a Lactobacillus species to re-colonise the vagina of women with recurrent bacterial vaginosis. Journal of medical microbiology 2000, 49, 543-552.

(4) Nouri, Z.; Karami, F.; Neyazi, N.; Modarressi, M. H.; Karimi, R.; Khorramizadeh, M. R.; Taheri, B.; Motevaseli, E.: Dual anti-metastatic and anti-proliferative activity assessment of two probiotics on HeLa and HT-29 cell lines. Cell Journal (Yakhteh) 2016, 18, 127.

(5) Sankaranarayanan, R.; Ferlay, J.: Worldwide burden of gynaecological cancer: the size of the problem. Best practice & research Clinical obstetrics & gynaecology 2006, 20, 207-225.

(6) Leeman, M. F.; Curran, S.; Murray, G. I.: New insights into the roles of matrix metalloproteinases in colorectal cancer development and progression. The Journal of pathology 2003, 201, 528-534.

(7) Vásquez, A.; Jakobsson, T.; Ahrné, S.; Forsum, U.; Molin, G.: Vaginal Lactobacillus flora of healthy Swedish women. Journal of clinical microbiology 2002, 40, 2746-2749.

(8) Kaewsrichan, J.; Peeyananjarassri, K.; Kongprasertkit, J.: Selection and identification of anaerobic lactobacilli producing inhibitory compounds against vaginal pathogens. FEMS Immunology & Medical Microbiology 2006, 48, 75-83.

(9) Motevaseli, E.; Shirzad, M.; Raoofian, R.; Hasheminasab, S.-M.; Hatami, M.; Dianatpour, M.; Modarressi, M.-H.: Differences in vaginal lactobacilli composition of Iranian healthy and bacterial vaginosis infected women: a comparative analysis of their cytotoxic effects with commercial vaginal probiotics. Iranian Red Crescent Medical Journal 2013, 15, 199.

(10) Escamilla, J.; Lane, M. A.; Maitin, V.: Cell-free supernatants from probiotic Lactobacillus casei and Lactobacillus rhamnosus GG decrease colon cancer cell invasion in vitro. Nutrition and cancer 2012, 64, 871-878.

(11) Xu, L.; Zhang, L.; Hu, C.; Liang, S.; Fei, X.; Yan, N.; Zhang, Y.; Zhang, F.: WNT pathway inhibitor pyrvinium pamoate inhibits the self-renewal and metastasis of breast cancer stem cells. International journal of oncology 2016, 48, 1175-1186.

(12) Cui, H.-Y.; Guo, T.; Wang, S.-J.; Zhao, P.; Dong, Z.-S.; Zhang, Y.; Jiang, J.-L.; Chen, Z.-N.; Yu, X.-L.: Dimerization is essential for HAb18G/CD147 promoting tumor invasion via MAPK pathway. 2012.

(13) Safranek, J.; Pesta, M.; Holubec, L.; Kulda, V.; Dreslerova, J.; Vrzalova, J.; Topolcan, O.; Pesek, M.; Finek, J.; Treska, V.: Expression of MMP-7, MMP-9, TIMP-1 and TIMP-2 mRNA in lung tissue of patients with non-small cell lung cancer (NSCLC) and benign pulmonary disease. Anticancer research 2009, 29, 2513-2517.

(14) Setoodeh, R.; Hakam, A.; Shan, Y.: Cerebral metastasis of cervical cancer, report of two cases and review of the literature. International journal of clinical and experimental pathology 2012, 5, 710.

(15) LeGolvan, M. P.; Resnick, M.: Pathobiology of colorectal cancer hepatic metastases with an emphasis on prognostic factors. Journal of surgical oncology 2010, 102, 898-908.

(16) Lu, P.; Takai, K.; Weaver, V. M.; Werb, Z.: Extracellular matrix degradation and remodeling in development and disease. Cold Spring Harbor perspectives in biology 2011, 3, a005058.

(17) Nami, Y.; Abdullah, N.; Haghshenas, B.; Radiah, D.; Rosli, R.; Khosroushahi, A. Y.: Probiotic potential and biotherapeutic effects of newly isolated vaginal Lactobacillus acidophilus 36YL strain on cancer cells. Anaerobe 2014, 28, 29-36.

(18) Motevaseli, E.; Shirzad, M.; Akrami, S. M.; Mousavi, A.-S.; Mirsalehian, A.; Modarressi, M. H.: Normal and tumour cervical cells respond differently to vaginal lactobacilli, independent of pH and lactate. Journal of medical microbiology 2013, 62, 1065-1072.

(19) McIntosh, G. H.; Royle, P. J.; Playne, M. J.: A probiotic strain of L. acidophilus reduces DMH-induced large intestinal tumors in male Sprague-Dawley rats. Nutrition and cancer 1999, 35, 153-159.

(20) Yamazaki, K.; Tsunoda, A.; Sibusawa, M.; Tsunoda, Y.; Kusano, M.; Fukuchi, K.; Yamanaka, M.; Kushima, M.; Nomoto, K.; Morotomi, M.: The effect of an oral administration of Lactobacillus

casei strain shirota on azoxymethane-induced colonic aberrant crypt foci and colon cancer in the rat. Oncology reports 2000, 7, 977-1059.

(21) Motevaseli, E.; Azam, R.; Akrami, S. M.; Mazlomy, M.; Saffari, M.; Modarressi, M. H.; Daneshvar, M.; Ghafouri-Fard, S.: The Effect of Lactobacillus crispatus and Lactobacillus rhamnosusCulture Supernatants on Expression of Autophagy Genes and HPV E6 and E7 Oncogenes in The HeLa Cell Line. Cell Journal (Yakhteh) 2016, 17, 601.

(22) Lan, A.; Lagadic-Gossmann, D.; Lemaire, C.; Brenner, C.; Jan, G.: Acidic extracellular pH shifts colorectal cancer cell death from apoptosis to necrosis upon exposure to propionate and acetate, major end-products of the human probiotic propionibacteria. Apoptosis 2007, 12, 573-591.

Comparison Between Echocardiography and Computerized Tomography Pulmonary Angiography in Detection of Pulmonary Hypertension in Advanced Chronic Lung Diseases

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ABSTRACT

Objective: To compare between echocardiography and CT pulmonary angiography (CTPA) in the detection of pulmonary hypertension in patients with chronic advanced lung diseases.

Method: 45 pateints with diagnosis of chronic advanced lung diseases were recuited in the sudy. Data of all patients were collected including patients' demographic characteristics, and the results of investigations which were performed for each patient which includes echocardiography and computerized tomography pulmonary angiography.

Results: mean age of patients 53.4 ± 8.3 years, with two thirds of patients aged >50 years. Males were relatively dominant than females; 24 (53.3%) vs. 21 (46.7%) respectively. Majority of the cases (75.6%) were smokers,13 cases (28.9%) were employed. 71.1% of the cases had COPD. The mean pulmonary artery diameter of all cases was 26.3 ± 3.8 mm. The main pulmonary artery (MPA) to aorta (AO) ratio was elevate > 1:1 in 48.9% of cases. Right ventricle wall thickness ≥ 4 mm in 16 cases (35.6%).

Conclusion: This study has shown that although CT and echocardiographic measurements are both moderately strong correlates of mPAP in patients with a spectrum of underlying disorders, using these tests in combination is considerably more powerful in determining increased pulmonary arterial pressure than either test in isolation.

Keywods: *Computerized Tomography, Pulmonary Angiography, Echocardiography, Pulmonary Hypertension*

INTRODUCTION

Pulmonary Arterial hypertension (PAH) is a debilitating condition of the pulmonary vasculature that was first described in 1891 by a German physician E. Romberg [(1)]. PAH is a hemodynamic state defined by a resting mean pulmonary artery pressure at or above 25 mm Hg [(2)] and characterized by elevations in the pulmonary arterial pressure and pulmonary vascular resistance (PVR) leading to right ventricular failure and premature death [(3)]. While PAH remains a rare disease, it is being increasingly recognized. The estimates prevalence of category 1 PAH was 15.0 cases/millions of adult and incidence of 2.4 cases/millions of adult per year in France [(4)], and 10.6 and 2.0, respectively in the United States [(5)]. The age and gender distribution of the disease appears to have evolved over time. While the French registry confirmed the female-to-male ratio of 1.6 [(4)], the US registry depicts a much higher female preponderance, with a female to male ratio of 3.9 [(6)].

Chest scans have largely supplanted chest x-rays in patients with PAH, partly due to its ability to detect thromboembolism in some cases and to identify any diffuse parenchymal lung diseases that may not be evident in 15% of chest x-rays [(7, 8)]. With advances in CT technology and its wide availability, there have been attempts to address the utility of CT to predict the presence of PAH; it is useful in delineating the anatomic detail of the pulmonary vasculature. Contrast-enhanced images

may show intraluminal abnormalities in the arteries and veins, which are useful for confirming etiologies such as thromboembolic disease [9, 10]. High-resolution CT may be helpful for the diagnosis of pulmonary hypertension in patients with suspected diffuse lung disease [11]. It had been reported that a main pulmonary artery of 29 mm or larger, as shown on a CT scan, has a sensitivity of 69% and a specificity of 100% for predicting pulmonary hypertension [7, 12].

The Doppler echocardiogram can simultaneously provide an estimate of right ventricular (RV) systolic pressure, functional and morphologic cardiac sequelae of PAH, and identification of possible cardiac causes of PAH [13]. Echocardiography facilitates the estimation of pulmonary artery systolic pressure, assessment of cardiac cause of PAH, assessment of severity of RV dysfunction, assessment of prognostic variables [13]. We aimed in the current study to compare between CT pulmonary angiography (CTPA) and echocardiography in detection of pulmonary hypertension in patients with advanced chronic lung diseases.

METHOD

A prospective study conducted at the Radiology department of Baghdad Teaching Hospital during the period from the 1st of February 2016 to the end of November 2016. A 45 adult patients with age range (37—70) years, maleto female ratio (24:21), who were with approved diagnosis of advance chronic lung diseases by chest physician which is based on 2015 ESC/ERS guideline [14]. The following were excluded from the study: patients with acute lung disease, patients with diagnosed primary pulmonary hypertension, and patient's allergic to contrast media. All patients were referred from out-patients clinic in Baghdad teaching hospital.

Written informed consent obtained from all patients and the following information were recorded in a specially designed questionnaire paper: Socio-demographic Information: age, occupation, gender, smoking habit, detailed medical history about the type of chronic lung disease clinical data (ECG, Oxymetry) were obtained from all patients.

All patients enrolled in this study were examined by: echocardiography using (Phillips enviser), CTA pulmonary angiography using (Toshiba Aquilion 128 slice) multidetector with following parameters (kVp. 120), (mAs. 300) and 0.9 mm slid thickness. All the patients were examined in supine position and 90 cc of intravenous contrast media (Iohexol 755mg) injected through the cannula in anti-cubital vein with rate (4 ml/sec). Patients were scanned after predetermined period using a bolus tracking software and the following signs were reviewed; using electronic crosser pulmonary artery diameter was measured (3 mm) from the bifurcation in axial image in a mediastinal window, the diameter of the ascending aorta was measured at the same level, PA/Ao ratio was calculated (figure 1), right ventricular wall thickness measured at the mid wall of the Rt. Ventricle in 4 champers view in axial image. the position of inter ventricularseptum (normal, straitening or bowing to left) figure 2, the diameter of segmental PA equal or more to the adjacent bronchi in lung lobes, the patient or the absent of reflex of contrast media in Inferior vena cava (IVC) and hepatic veins, rericardial effusion if present or absent also reviewed, and lung and parenchymal changes reviewed in lung window (ground glass, emphysematous bullae, identical finding as cavitary lesion and Bronchiectatic changes) as illustrated in figure 1 and 2.

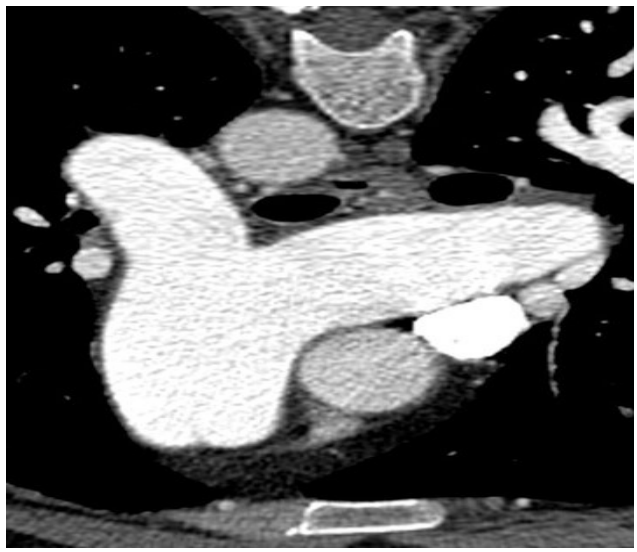

Figure 1: Show pulmonary artery diameter <29mm and increase Pa/Ao ratio at the level of PA biforcation

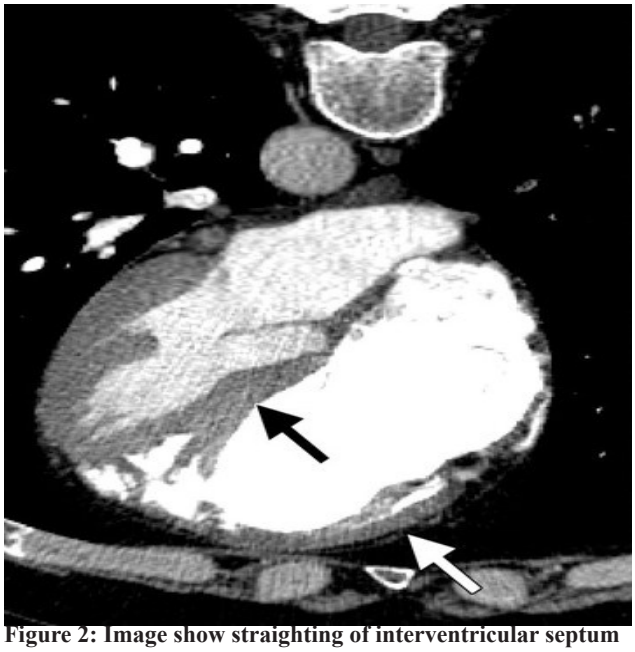

Figure 2: Image show straighting of interventricular septum

STATISTICAL ANALYSIS

Data of the 45 cases were entered and analyzed by using the statistical package for social sciences (SPSS) software version 22, IBM, Chicago, US, for windows. Descriptive statistics were presented as mean, standard deviation (SD), frequencies (No.) and proportion (%). As we did not have a gold standard for the diagnosis of PAH, kappa statistics was used for the analysis and assessment of the agreement between CT and Echo results. Where the CT signs of PAH compared to the Echo results [15]. Level of significance, P.value was set at 0.05. Finally, results were presented in tables and or figures with an explanatory paragraph.

RESULTS

There were 45 patients enrolled in this study with a mean age of 53.4 ± 8.3 (range: 37-70) years, moreover, about two thirds of the studied group aged more than 50 years. Males were relatively dominant than females; 24 (53.3%) vs. 21 (46.7%) respectively. Majority of the cases (75.6%) were smokers and only 13 cases (28.9%) were employed. Chronic obstructive lung disease (COPD) was the dominant type of chronic lung diseases among the cases, reported in 32 cases (71.1%), followed by bronchiectasis (20%) and the least frequent was interstitial lung diseases (ILD) in only 4 cases (8.9%). The clinical and radiological findigns are illustrated in table 1.

Table 1: clinical and radiological findigns

Variables	Value
Main pulmonary artery diameter (mm), mean ± SD	26.3 ± 3.8
≥29 mm	26 (57.8%)
<29 mm	19 (42.2%)
Main pulmonary artery diameter by gender (mm), mean ± SD	
In male (mm), mean ± SD	27.2 ± 1.9
In female (mm), mean ± SD	25.3 ± 2.4
Ratio of segmental pulmonary arteries to adjacent bronchi	
>1:1	21 (46.7%)
Normal	24 (53.3%)
Ratio of MPA to AO	
Increased (>1:1)	22 (48.9%)
Normal (≤1:1)	23 (51.1%)
Parenchymal changes detected by CT	
Ground glass	26 (57.8%)
Emphysematous bullae scattered throughout the lung	25 (55.6%)
Bronchiectatic changes	12 (26.7%)
Cavity lesion	8 (17.8%)
Parenchymal consolidation	4 (8.9%)
Thick interlobular septa	3 (6.7%)
PAH by echocardiography	27 (60.0%)
Right ventricle wall thickness (mm), mean ± SD	3.42 ± 1.56
≥4	16 (35.6%)
<4	29 (64.4%)
Inter-ventricular septum left ward bowing or strained	15 (33.3%)
Right ventricle dilatation	16 (35.6%)
ECG finding	
RAD	21 (46.7%)
RAD + RVH	4 (8.9%)
Normal	20 (44.4%)
MPA: Main pulmonary artery, AO: Aorta, RAD: right axis deviation, RVH: right ventricular hypertrophy	

There was substantial agreement between echocardiography findings of PAH with main pulmonary artery diameter, MPA to adjacent AO, Right ventricle wall thickness, right ventricle wall thickness, and Parenchymal changes, but there was poor agreement with PA to adjacent bronchi ratio, as illustrated in table 2. Figure 3 illustrate the different lung diseases compared by PAH diagnosed using echo.

Table 2: agreement between echocardiography results and CT findings

CT scene findings	Echocardiographic findings		Kappa	p-value
	PAH	No PAH		
	27	**18**	-	-
Main pulmonary artery diameter			0.680	0.003
≥ 29	23 (85.2%)	3 (16.7%)		
< 29	4 (14.8%)	15 (83.3%)		
MPA to adjacent AO			0.780	0.002
Increased	22 (81.5%)	0 (0%)		
Normal	5 (18.5%)	18 (100%)		
PA to adjacent bronchi ratio			0.130	0.392
> 1: 1	14 (51.9%)	7 (38.9%)		
Normal	13 (48.1%)	11 (61.1%)		
Right ventricle wall thickness			0.620	0.001
≥ 4 mm	16 (59.3%)	0 (0%)		
< 4 mm	11 (40.7%)	18 (100%)		
Parenchymal changes			0.610	0.001
Present	26 (96.3%)	7 (38.9%)		
Absent	1 (3.7%)	11 (61.1%)		
AO: Aorta, OA: pulmonary artery				

Figure 3: Comparison of pulmonary hypertension according to Echo findings in patients with different lung diseases

DISCUSSION

Pulmonary hypertension may be suspected based on the clinical history, physical examination and electrocardiogram findings but imaging is usually central to confirming the diagnosis, establishing a cause and guiding therapy. The diagnostic pathway of PAH involves a variety of complimentary investigations [16]. Computed tomography pulmonary angiography (CTPA) and Echocardiography are important modalities in the assessment of PH and have established a central role both in helping identify an underlying cause for pulmonary hypertension and assessing resulting functional compromise. Echocardiography (ECHO) is an important noninvasive tool in assessment of PH and has been used to screen for the disease, determine right and left heart structure and function, and assess response to therapy in persons with PH [2, 16, 17]. Despite that Echocardiography and right heart catheterization are the main diagnostic method in PAH [17], the main role of the CT scan to evaluate for any associated underlying diseases, however, there have been attempts to address the utility of CT to predict the presence of PAH [7]. Reliability of noninvasive estimation of pulmonary arterial pressure (PAP) and of PAH diagnosis with echocardiography was discussed extensively, nonetheless, Doppler estimates of systolic and particularly mPAP are imprecise in individual patients, this is likely because of the intrinsic limitations of echocardiography and its operator dependency [18].

The current study tried to compare between CTA and echocardiography in detection of pulmonary hypertension in patients with advanced chronic lung

diseases, therefore (45) patients were clinically assessed and examined using both Echo and CT scanning.

Regarding the demographic characteristics, the mean age of the studied group was 53.4 ± 8.3 (range: 37-70) years and (68.9%) aged more than 50 years. Males were relatively dominant than females; (53.3%) and (46.7%), respectively these findings go with the clinical picture of chronic lung diseases where pulmonary disease prevalence increases with age and contributes to morbidity and mortality in older patient [19, 20]. On the other hand, the gender differences in advanced lung disease are yet not well documented [20-22].

The present study found that majority of the cases (75.6%) were smokers, this was not unexpected, because smoking is widely postulated as the main causal agent and cessation of smoking is the only method currently known to slow lung function decline [23, 24]. From Other point of view, smoking is a major risk factor of PAH, and PAH is common in smokers with COPD and thereby not correlated with the degree of airway obstruction [25], in a previous study from Switzerland in 2010 Schiess et al. documented that smoking is one of the major risk factors of PAH [25].

In the present study COPD was the dominant chronic lung diseases among the cases, it was reported in (71.1%), followed by bronchiectasis (20%) and the least frequent was interstitial lung disease (ILD) (in only 8.9%) of the cases, these findings supported by that documented by Akgün et al in 2012 [19]. From other aspect of view, Shujaat et al. [26] found that PAH is more frequent in COPD and varies from 20 to 91% depending on the cut point of PAP used for the definition of PAH.

In the current study according to the echocardiography results (60%) of the cases had pulmonary artery hypertension (PAH) this finding is close to that reported by Iyer et al. study in 2014 in USA [27]. However, estimates of the prevalence of PAH is vary widely from as low as 10% to as high as 85% depending on the severity of the underlying lung disease and the diagnostic criteria as well as approach used [28-30], moreover, a previous study was conducted by Arcasoy et al [29] reported that the prevalence of PAH in patients with obstructive lung diseases compared with those with interstitial lung diseases or pulmonary vascular disease was 38%, 54%, and 67%, respectively, depend on the estimation of PAP [29]. The variation among studies in the prevalence of PAH attributed to the population heterogeneity and the differences in the cutoff points of mPAP used for the diagnosis of PAH, where higher prevalence reported with the lower cutoff points [29], in addition to the method of diagnosis.

With regard to the main pulmonary artery diameter, the current study found that the mean main pulmonary artery diameter was (26.3 ± 3.8mm) which was very close to the finding of Ussavarungsi et al. [7] study which documented a mean of (26.6 ± 2.9 mm). From other point of view, our study with a cut-off point of 29 mm as of the mPA diameter was used. This cut-off was widely used in previous studies and documented to have good specificity value [7, 31, 32]. According to this cutoff point, out of the 27 patients with PH on echo, 85.2% had a mPA diameter of ≥ 29 mm giving good agrrement of (84.4%) between the CT measurement of the mPA diameter and the Echo finding, this indicate that mPA measured by CT could predict PH and this sign is helpful in diagnosis of PAH. Moreover, our finding of the mean mPA diameter lower than (27.2 ± 0.6 mm) that reported in an earlier study by Edward et al [32]. Nonetheless, many studies have tried to determine the normal range of the main PA size and found that the mPA diameter is easy to be defined anatomically and is highly reproducible, in addition, the ascending aorta can also be measured to calculate the ratio of main PA to the aortic diameter (PA/Ao) [7, 12, 29, 32]. Some authors used different cut-off point of PHT according to their clinical evaluation and studied population and different mean values of the mPA diameter were concluded; Kuriyama et al. reported a somewhat smaller mean PA size of 24.2 mm and used this value as a predictor for PH [12]. The possible discrepancy may be due to the differences in CT techniques, race and patients characteristics [7, 12, 29, 32].

CONCLUSIONS

CT has the potential to provide the first pointer toward the diagnosis of the PAH in the patient with advance chronic lung disease, also CT and echocardiography are providing complementary information about increased pulmonary arterial pressure: CT offers anatomic information about the size of the pulmonary arterial tree, and echocardiography identifies the functional consequences of PH.

Conflict of Interest : None

Ethical Clearance: Informed written consent was

obtained from all the participants in the study, and the study and all its procedure were done in accordance with the Helsinki Declaration of 1975, as revised in 2000. approved by the scientific council of diagnostic radiology of the Arab board for Health specialization

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REFERANCES

1. Galie N, Hoeper MM, Humbert M, Torbicki A, Vachiery JL, Barbera JA, et al. Guidelines for the diagnosis and treatment of pulmonary hypertension: the Task Force for the Diagnosis and Treatment of Pulmonary Hypertension of the European Society of Cardiology (ESC) and the European Respiratory Society (ERS), endorsed by the International Society of Heart and Lung Transplantation (ISHLT). European heart journal. 2009;30(20):2493-537.
2. Badesch DB, Champion HC, Sanchez MA, Hoeper MM, Loyd JE, Manes A, et al. Diagnosis and assessment of pulmonary arterial hypertension. J Am Coll Cardiol. 2009;54(1 Suppl):S55-66.
3. Ghamra ZW, Dweik RA. Primary pulmonary hypertension: an overview of epidemiology and pathogenesis. Cleveland Clinic journal of medicine. 2003;70 Suppl 1:S2-8.
4. Humbert M, Sitbon O, Chaouat A, Bertocchi M, Habib G, Gressin V, et al. Pulmonary arterial hypertension in France: results from a national registry. American journal of respiratory and critical care medicine. 2006;173(9):1023-30.
5. Frost AE, Badesch DB, Barst RJ, Benza RL, Elliott CG, Farber HW, et al. The changing picture of patients with pulmonary arterial hypertension in the United States: how REVEAL differs from historic and non-US Contemporary Registries. Chest. 2011;139(1):128-37.
6. Badesch DB, Raskob GE, Elliott CG, Krichman AM, Farber HW, Frost AE, et al. Pulmonary arterial hypertension: baseline characteristics from the REVEAL Registry. Chest. 2010;137(2):376-87.
7. Ussavarungsi K, Whitlock J, Lundy T, Carabenciov I, Burger C, Lee A. The Significance of Pulmonary Artery Size in Pulmonary Hypertension. Diseases. 2014;2(3):243.
8. Zompatori M, Bna C, Poletti V, Spaggiari E, Ormitti F, Calabro E, et al. Diagnostic imaging of diffuse infiltrative disease of the lung. Respiration; international review of thoracic diseases. 2004;71(1):4-19.
9. Wijesuriya S, Chandratreya L, Medford AR. Chronic pulmonary emboli and radiologic mimics on CT pulmonary angiography: a diagnostic challenge. Chest. 2013;143(5):1460-71.
10. Schiebler ML, Bhalla S, Runo J, Jarjour N, Roldan A, Chesler N, et al. Magnetic resonance and computed tomography imaging of the structural and functional changes of pulmonary arterial hypertension. Journal of thoracic imaging. 2013;28(3):178-93.
11. Lang IM, Plank C, Sadushi-Kolici R, Jakowitsch J, Klepetko W, Maurer G. Imaging in pulmonary hypertension. JACC Cardiovascular imaging. 2010;3(12):1287-95.
12. Kuriyama K, Gamsu G, Stern RG, Cann CE, Herfkens RJ, Brundage BH. CT-determined pulmonary artery diameters in predicting pulmonary hypertension. Investigative radiology. 1984;19(1):16-22.
13. Galie N, Ghofrani HA, Torbicki A, Barst RJ, Rubin LJ, Badesch D, et al. Sildenafil citrate therapy for pulmonary arterial hypertension. The New England journal of medicine. 2005;353(20):2148-57.
14. Galie N, Humbert M, Vachiery JL, Gibbs S, Lang I, Torbicki A, et al. [2015 ESC/ERS Guidelines for the diagnosis and treatment of pulmonary hypertension]. Kardiologia polska. 2015;73(12):1127-206.
15. Viera AJ, Garrett JM. Understanding interobserver agreement: the kappa statistic. Family medicine. 2005;37(5):360-3.
16. Mathai S, Hassoun P. The Role of Echocardiography in the Diagnosis and Assessment of Pulmonary Hypertension. Adv Pulm Hypertens 2008;7(4).
17. Hye-Sun S, Nae-Hee L. Diagnosis and assessment of pulmonary arterial hypertension. Korean J Med. 2010;78(1):5-13.
18. Badesch DB, Champion HC, Gomez Sanchez MA, Hoeper MM, Loyd JE, Manes A, et al. Diagnosis and Assessment of Pulmonary Arterial

Hypertension. Journal of the American College of Cardiology. 2009;54(1, Supplement):S55-S66.

19. Akgun KM, Crothers K, Pisani M. Epidemiology and management of common pulmonary diseases in older persons. The journals of gerontology Series A, Biological sciences and medical sciences. 2012;67(3):276-91.
20. Hofer M. Advanced chronic lung disease: need for an active interdisciplinary approach. Swiss medical weekly. 2007;137(43-44):593-601.
21. Chapman KR. Chronic obstructive pulmonary disease: are women more susceptible than men? Clinics in chest medicine. 2004;25(2):331-41.
22. Dales RE, Mehdizadeh A, Aaron SD, Vandemheen KL, Clinch J. Sex differences in the clinical presentation and management of airflow obstruction. The European respiratory journal. 2006;28(2):319-22.
23. Panday S, Reddy SP, Ruiter RA, Bergstrom E, de Vries H. Nicotine dependence and withdrawal symptoms among occasional smokers. The Journal of adolescent health : official publication of the Society for Adolescent Medicine. 2007;40(2):144-50.
24. Pauwels RA, Buist AS, Ma P, Jenkins CR, Hurd SS. Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease: National Heart, Lung, and Blood Institute and World Health Organization Global Initiative for Chronic Obstructive Lung Disease (GOLD): executive summary. Respiratory care. 2001;46(8):798-825.
25. Schiess R, Senn O, Fischler M, Huber LC, Vatandaslar S, Speich R, et al. Tobacco smoke: a risk factor for pulmonary arterial hypertension? A case-control study. Chest. 2010;138(5):1086-92.
26. Shujaat A, Bajwa AA, Cury JD. Pulmonary Hypertension Secondary to COPD. Pulmonary medicine. 2012;2012:203952.
27. Iyer AS, Wells JM, Vishin S, Bhatt SP, Wille KM, Dransfield MT. CT scan-measured pulmonary artery to aorta ratio and echocardiography for detecting pulmonary hypertension in severe COPD. Chest. 2014;145(4):824-32.
28. Come CE, Divo MJ, San Jose Estepar R, Sciurba FC, Criner GJ, Marchetti N, et al. Lung deflation and oxygen pulse in COPD: results from the NETT randomized trial. Respiratory medicine. 2012;106(1):109-19.
29. Arcasoy SM, Christie JD, Ferrari VA, Sutton MS, Zisman DA, Blumenthal NP, et al. Echocardiographic assessment of pulmonary hypertension in patients with advanced lung disease. American journal of respiratory and critical care medicine. 2003;167(5):735-40.
30. Minai OA, Chaouat A, Adnot S. Pulmonary hypertension in COPD: epidemiology, significance, and management: pulmonary vascular disease: the global perspective. Chest. 2010;137(6 Suppl):39s-51s.
31. Karazincir S, Balci A, Seyfeli E, Akoglu S, Babayigit C, Akgul F, et al. CT assessment of main pulmonary artery diameter. Diagnostic and interventional radiology (Ankara, Turkey). 2008;14(2):72-4.
32. Edwards PD, Bull RK, Coulden R. CT measurement of main pulmonary artery diameter. The British journal of radiology. 1998;71(850):1018-20.

Angiotensinogen II Type I Receptor A1166C Is Associated with Serum Sodium Level and Essential Hypertension in Javanese Population

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ABSTRACT

Background and Objective: Genetic risk factors associated with essential hypertension includes the polymorphism of AGTR1 A1166C. AGTR1, a gene of *Renin-Angiotensin-Aldosteron-System* has also been associated with dysfunctions in sodium absorption and natriuretic hormone. Therefore, the aim of this study was to investigate the correlation of AGTR1 A1166C and serum sodium level with essential hypertension within the specific ethnic group of Javanese in Sidoarjo - Indonesia.

Method: This case-control study was designed as a cross-sectional study, with 106 Javanese subjects. Genotyping for AGTR1 A1166C polymorphism was done using real-time PCR and DNA sequencing, while serum sodium level, blood glucose and lipid levels were determined by standard clinical laboratory methods.

Results: Our observations showed that AGTR1 A1166C, in particular the genotype AC, significantly correlated with high serum sodium level ($p = 0.001$) and appeared to be a risk factor for hypertension with OR 4.66 (95% CI = 1.065–21.51, $p = 0.0445$). Moreover, the serum sodium level was positively correlated with systolic blood pressure (SBP) or diastolic blood pressure (DBP) ($r = 0.3981$, $r = 0.4342$, respectively, $p < 0.0001$).

Conclusion: This study demonstrates that AGTR1 A1166C along with increased serum sodium level are major risk factors for essential hypertension in the Javanese population residing in Sidoarjo province in Indonesia.

***Keywords**: AGTR1, serum sodium, hypertension, genetic factors*

INTRODUCTION

Hypertension is a significant health problem in Indonesia. The national data from 2007 to 2013 shows a 5.9% decrease in the average prevalence of hypertension, from 31.7% to 25.8%, suggesting that approximately 65,048,110 individuals are currently afflicted with hypertension.[1] However, the prevalence varies across Indonesia, from as low as 16.8% in Papua to as high as 30.9% in Bangka-Belitung.[1] There are many elements that could contribute to this variation, including genetic factors and lifestyle.[2] Although genetic factors are hardly modifiable, studies have shown that lifestyle adjustment relevant to a specific pathway associated with a particular genetic factor may reduce the overall risk of hypertension.[2–4] Therefore, it is essential to uncover potential genetic risk factors associated with populations afflicted with hypertension.

Angiotensinogen II Type 1 Receptor (AGTR1), in particular the allele A1166C genotype AC/CC (rs5186), has been shown as a predisposition factor for

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hypertension in Asian and Caucasian populations in a meta-analysis study.[5] AGTR1 is one of the major receptor protein in *Renin-Angiotensin-Aldosteron-System* (RAAS). By association with G proteins that activate a phosphatidylinositol-calcium second messenger system, AGTR1 mediates the classical biological actions of angiotensin.[6] AGTR1 has been associated with dysfunctions in sodium absorption and natriuretic hormone function.[7] It has also been associated with thickening of arterial walls, renal sodium reabsorption and retention.[8–10]

Certain lifestyle combined with a specific genotype may pose as a risk to promote, prevent, or at least modify hypertension severity.[11] If a specific variant of AGTR1 associated with high serum sodium level, it would be helpful to advise the individuals carrying that specific variant to adopt a low-sodium diet, thus, effectively lowering the risk for hypertension. With this in mind, we sought to identify AGTR1 A1166C allele frequencies and the risk conferred by specific genetic variants and associated biochemical factors for essential hypertension. As similar population genetic studies may reveal different, even conflicting conclusions, we conducted ours to see whether A1166C is a predisposition factor for hypertension in Sidoarjo, East Java Province, which has a reported hypertension prevalence of ~ 26%. We recruited specific ethnic Javanese patients that came to the Primary Health Centers, the lowest tiered health care provided by the government. A similar genetic population study has been reported,[12] although the subjects were from Central Java region, presented a rather different life style profile (e.g. consumption of sweet, instead of salty cooking habit), and were recruited from referral hospitals with higher level of health care facilities intended for more severe diseases.

MATERIALS AND METHOD

Participants

A cross-sectional study was conducted in unrelated adult individuals who had visited the Primary Health Centre of Sukodono, Sidoarjo, Indonesia. Participants were classified into two groups – hypertensive patients, if systolic and/or diastolic blood pressure (SBP and DBP, respectively) were ≥ 140 mmHg and ≥ 90 mmHg, respectively, and not hypertensive if SBP and DBP were < 140 mmHg and < 90 mmHg, respectively. A medical doctor diagnosed newly hypertensive patients based on International Society of Hypertension Writing Group (ISWG, 2003). All participants were residents of Sidoarjo, Indonesia for at least three generations. Patients showing kidney or thyroid dysfunction, pregnancy, and those using contraceptive pills or other medications affecting blood pressure were excluded.

Interviews

All participants were interviewed using a questionnaire with regard to their lifestyle, smoking, alcohol consumption, food intake, and their family history of hypertension as part of demographic data collection.

Sample collection and assays

Five milliliter (5 mL) of peripheral venous blood was collected from all the participants in an ethylene diamine-tetra acetic acid (EDTA) vial after 12 h of fasting. One milliliter of whole blood was used for DNA extraction and the remaining for biochemical analyses related to hypertension risk factors, namely serum sodium, blood glucose and lipid level measurements. Serum sodium was determined using Ion Selective Electrodes (ISE), blood glucose using Glucose oxidase-Phenol Aminophenazone (GOD–PAP), and lipids using Cholesterol Oxidase-Phenol Aminophenazone (CHOD–PAP) standard methods.

Genotyping for AGTR1 A1166C polymorphism was performed by real-time PCR (ABI 7300 Real Time PCR System, Applied Biosystems, Foster City, CA) with SYBR green probe (Eurogentec, Seraing, Belgium) PCR Core reagents. The primers used were: Forward 5'-AGCCTGCACCAT GTTTTGAG-3' and Reverse 5'-TACCAGGTGCAAGTGTAGCA-3' (rs5186 flanking bases 1104-1610, SNP at probe 1218, or NM_032049.3 flanking bases 1314-1820 with SNP at 1428). Genotypes were classified into two groups i.e. wild type (AA) or mutant (AC/CC). Confirmation of the A1166C allele was accomplished using a DNA-sequencing kit (ABI Prism Big Dye Sequencing kit), according to the manufacturer's instructions. DNA sequences were aligned using BLAST-NCBI program against reference sequence NM_032049.3 to detect A1428C (A1166C).

Statistical analyses

The data were analyzed for differences by multiple *t*-test or One-way ANOVA, and comparisons were

made using Mann-Whitney or Kruskal-Wallis tests, as appropriate. Association among variables was tested by Pearson's r, linear regression, or Spearman correlation test, as appropriate. Fisher exact was used to test association of AGTR1 A1166C genotypes (A/C alleles) with hypertension. An odds ratio at [95% confidence intervals (CI)] was calculated as an index of the association of the gene with the disease. Data are presented as mean ± SD or median ± CI 95% (lower confidence limit; upper confidence limit). Statistical significance was defined as p-value < 0.05. All statistical analysis was performed using GraphPad Prism version 7 (GraphPad Software, La Jolla, CA, USA).

Ethical Considerations: The study was conducted in accordance with the guidelines of the Helsinki Declaration. The study protocol was approved by the Ethical Committee for Health Research, Faculty of Medicine, Wijaya Kusuma University, Surabaya (No. 101109/SLE/FK/UWKS/2016). Written informed consent was also obtained from all the participants prior to the study.

RESULTS AND DISCUSSION

Baseline characteristics

From 306 individuals that were interviewed, 206 fulfilled the inclusion and exclusion criteria; however, during the study some individuals dropped out, leaving a total of 106 subjects in the current study. Of these, 66 individuals presented with essential hypertension and were slightly older that the remaining 40 normotension individuals (Table 1). The number of female subjects was higher as compared with the number of male subjects in both groups (p=0.302). SBP in hypertensive patients were significantly higher (157 ± 15 mm Hg) than that of normotensive controls (118 ± 9 mm Hg), $p < 1\times10^{-11}$. Similarly, DBP in patients were higher (93.79 ± 10 mm Hg) than in controls (76.9 ± 8 mm Hg), $p = 5.1\times10$-14 (Table 1). Concomitantly, the serum sodium levels were also higher in hypertensive patients (141.6 ± 2.79 mg/dL) than in normotensive individuals (138.2 ± 2.56 mg/dL). Blood glucose, lipids, BMI, and smoking status were not different between patient and control groups, except for levels of low density lipoproteins (LDL), which was high in the hypertensive group (Table 1). Consumption of salt was statistically different between both groups, with a higher consumption seen among the hypertensive individuals.

Genotypes

Using real-time PCR and DNA sequencing we detected the polymorphic variant A1166C. In our sample population, the genotypes at 1166 were predominantly AA (85.8%), and AC (14.2%), whereas genotype CC was not detected. Others have reported similar results, with AA as the major genotype and AC as the minor one; CC was not detected in Malaysia (0/151) and Indonesia (0/60; 0/113).[12–14] It is not clear why CC genotype was not detected. However, it is likely that due to a very small frequency, a larger sample size (more participants) may be required to detect it, or the CC genotype could be undergoing negative selection.[15]

Association of serum sodium, blood pressure and AC genotype with essential hypertension

Correlation of serum sodium level with SBP or DBP was analyzed using Pearson's r test. As shown in the scatter plots, a positive correlation was observed between serum sodium levels and SBP, with the Pearson r being 0.3981 (CI 0.2244–0.5473), $p < 0.0001$, and equation of linear regression $y = 2.929x - 268.4$. A positive correlation was also seen with DBP, where the Pearson r was 0.4342 (CI 0.2644–0.5772, $p < 0.0001$, and equation of linear regression $y = 1.778x - 162.1$. Correlation between polymorphism and serum sodium level was analyzed using the Spearman test, which showed a Spearman r of 0.5309 and $p < 0.0001$. Genotype AC associated with higher levels of serum sodium, albeit still within normal range ($p < 0.001$). Genotype AC was also associated with relatively higher mean of DBP ($p = 0.0326$). However, the SBP range did not differ between the AA and AC genotypes ($p = 0.1296$).

Although our observations are in line with majority of previous reports from Asian populations, they are contradictory to another Javanese-Indonesian study.[12] Our study showed that individuals carrying genotype AC have higher serum sodium level and blood pressure, in comparison with those carrying AA. In contrast, Irijanto et al. indicated that the genotype AA presented a risk factor for hypertension.[12] Such discrepancy may be due to the profile of the recruited patients, which may be complicated by organ dysfunctions and/or medications affecting blood pressure.

AGTR1 protein expression was positively correlated with SBP and DBP and negatively correlated with miR-155 expression level.[16] Allele C has been functionally

associated with hypertension, where its presence impairs downregulation of AGTR1 by hsa-miR-155, thus elevating AGTR1 protein levels.[17] The miR-155 expression was significantly decreased in subjects with CC genotype; however, the AGTR1 mRNA and protein expression were not significantly different in AA and AC genotypes.[16]

The level of serum sodium may be a result of salt consumption by an individual. Our study showed that proportion of individuals with high salt consumption was higher in the hypertensive group than in the normotensive group. Furthermore, the AC genotype associated with high level of serum sodium and relatively higher mean of DBP. Thus, dietary salt consumption and/or genetic variation may predispose an individual to hypertension. Intervention such as low-sodium diet for individuals with genotype AC could lessen serum sodium and thus decrease hypertension risk.

Table 1: Average characteristics of the subjects.

Variables	Hypertension (n = 66)	Normotension (n = 40)	*p* value
Age (years)	55.61 ± 10.59	50.42 ± 11.13	0.018
Sex (n (%))			0.302
Male	21 (19.8)	9 (8.5)	
Female	45 (68.2)	31(77.5)	
Blood pressure			
SBP (mmHg)	157 ± 15	118 ± 9	$< 1\times10^{-11}$
DBP (mmHg)	93.79 ± 10	76.9 ± 8	5.1×10^{-14}
Salt consumption [n (%)]			0.0194
Low: < 4 g/d	6 (9)	9 (22)	
Moderate 4–8 g/d	40 (61)	27 (68)	
High: > 8 g/d	20 (30)	4 (10)	
Serum sodium (mmol/L)	141.6 ± 2.79	138.2 ± 2.56	< 0.0001
Polymorphism A1166C			0.0045
AA [n (%)]	53 (80.3)	37 (93)	
AC [n (%)]	13 (19.7)	3 (7.5)	
BMI [n (%)]			> 0.999
Underweight	5 (7.6)	6 (15)	
Normal	26 (39.4)	18 (45)	
Overweight, obese	35 (53.9)	16 (40)	
Blood glucose (mg/dL)	128 ± 69	104 ± 38	0.132
Lipids (mg/dL)			
Total cholesterol	194 ± 41	193 ± 30	0.893
Triglycerides	145 ± 68	124 ± 55	0.192
HDL	41.6 ± 8	45.8 ± 9	0.058
LDL	139 ± 24	117 ± 21	0.00003
Smoking [n (%)]			> 0.999
Not at all	44 (66.7)	27 (67.5)	
Smoking (passive, active)	22 (33.3)	13 (32.5)	

Table 2. Association between AGTR1 A1166C and hypertension

Variables	Hypertension n (%)	Normotension n (%)	OR	95%CI Upper-Lower	*p* value
Genotype			4.66	1.065-21.51	0.0445
AC (mutant)	13 (12.3 %)	2 (1.9 %)			
AA	53 (50.0 %)	38 (35.8 %)			
Allele			4.261	1.059-19.33	0.0531
C (mutant)	13 (6.1%)	2 (0.9%)			
A	119 (56.1%)	78(36.8%)			

CONCLUSIONS

The present study demonstrated that AGTR1 A1166C, genotype AC, significantly correlates with high serum sodium level and DBP. In addition, serum sodium level also presented a positive correlation with blood pressure. Thus, the genotype AC, along with high serum sodium levels may pose a major risk for hypertension. Further studies are needed to see whether low-sodium diet for individuals with genotype AC could lessen serum sodium and blood pressure and thereby decrease the prevalence of hypertension among the Javanese population in the Sidoarjo province of Indonesia.

Data Availability

Data underlying the findings of the present study are available upon request.

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Conflict of Interest: Nil

REFERENCES

1. Infodatin Hipertensi. Ministry of Health Republic Indonesia, Jakarta-Indonesia. 2015.
2. Imaizumi T, Ando M, Nakatochi M, Maruyama S, Yasuda Y, Honda H, et al. Association of interactions between dietary salt consumption and hypertension-susceptibility genetic polymorphisms with blood pressure among Japanese male workers. Clin Exp Nephrol 2017;21:457-64. doi:10.1007/s10157-016-1315-3.
3. Tiffin N, Meintjes A, Ramesar R, Bajic VB, Rayner B. Computational analysis of candidate disease genes and variants for salt-sensitive hypertension in indigenous Southern Africans. PLoS One 2010;5:e12989. doi:10.1371/journal.pone.0012989.
4. Valencia DM, Naranjo CA, Parra MV, Caro MA, Valencia AV, Jaramillo CJ, et al. Association and interaction of AGT, AGTR1, ACE, ADRB2, DRD1, ADD1, ADD2, ATP2B1, TBXA2R and PTGS2 genes on the risk of hypertension in Antioquian population. Biomedica 2013;33:598-614.
5. Liu DX, Zhang YQ, Hu B, Zhang J, Zhao Q. Association of AT1R polymorphism with hypertension risk: An update meta-analysis based on 28,952 subjects. J Renin Angiotensin Aldosterone Syst 2015;16: 898-909. doi:10.1177/1470320315584096.
6. Guo DF, Sun YL, Hamet P, Inagami T. The angiotensin II type 1 receptor and receptor-associated proteins. Cell Res 2001;11:165-80. doi:10.1038/sj.cr.7290083.
7. Padia SH, Kemp BA, Howell NL, Fournie-Zaluski MC, Roques BP, Carey RM. Conversion of renal angiotensin II to angiotensin III is critical for AT2 receptor-mediated natriuresis in rats. Hypertension 2008;51:460-5. doi:10.1161/hypertensionaha.107.103242.
8. Sandberg K. Structural analysis and regulation of angiotensin II receptors. Trends Endocrinol Metab 1994;5:28-35.
9. Salomone LJ, Howell NL, McGrath HE, Kemp BA, Keller SR, Gildea JJ, et al. Intrarenal dopamine

D1-like receptor stimulation induces natriuresis via an angiotensin type-2 receptor mechanism. Hypertension 2007;49:155-161. doi:10.1161/01.HYP.0000251881.89610.ee.

10. Benetos A, Giron A, Joly L, Temmar M, Nzietchueng R, Pannier B, et al. Influence of the AGTR1 A1166C genotype on the progression of arterial stiffness: A 16-year longitudinal study. Am J Hypertens 2013;26:1421-7. doi:10.1093/ajh/hpt141.
11. Mishra S, Ingole S, Jain R. Salt sensitivity and its implication in clinical practice. Indian Heart J 2018;70:556-64. doi:https://doi.org/10.1016/j.ihj.2017.10.006.
12. Irijanto F, Nurrohmah O, Prasanto H, Azizah L, Sja'bani M. Angiotensin II type 1 receptor A1166C gene polymorphism and essential hypertension in Javanese population. Maj Kedokt Indon 2009;59:357-362.
13. Kurniawaty E, Kanedi M, Sadewa H. Gene polymorphism of angiotensin II type 1 receptor (Agtr1) as a risk factor of diabetic nephropathy in Indonesian patients with type 2 diabetes mellitus. IOSR J Dent Med Sci. 2017;16:66-8. doi:10.9790/0853-1612036668.
14. Yap RWK, Shidoji Y, Yap WS, Masaki M. Association and interaction effect of AGTR1 and AGTR2 gene polymorphisms with dietary pattern on metabolic risk factors of cardiovascular disease in Malaysian adults. Nutrients 2017;9:853. doi:10.3390/nu9080853.
15. Gibson G. Rare and common variants: Twenty arguments. Nat Rev Genet 2012;13:135-145. doi:10.1038/nrg3118.
16. Ceolotto G, Papparella I, Bortoluzzi A, Strapazzon G, Ragazzo F, Bratti P, et al. Interplay between miR-155, AT1R A1166C polymorphism, and AT1R expression in young untreated hypertensives. Am J Hypertens 2011;24:241-6. doi:10.1038/ajh.2010.211.
17. Sethupathy P, Borel C, Gagnebin M, Grant GR, Deutsch S, Elton TS, et al. Human microRNA-155 on chromosome 21 differentially interacts with its polymorphic target in the AGTR1 3' untranslated region: A mechanism for functional single-nucleotide polymorphisms related to phenotypes. Am J Hum Genet 2007;81:405-13. doi:10.1086/519979.

Analysis on Quality of Food Sanitation Hygiene and Escherichia Coli (*E. Coli*) Contamination at Restaurants around Commuter Line Stations in Central Jakarta, 2018

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ABSTRACT

Background A person's health condition and nutrition status is affected by the quality of food they eat. Therefore, everyone should be protected from any food that does not qualify food hygiene and sanitation requirements so it won't affect health. This research is to analyze the correlation between food sanitation hygiene according to standard for bacteriological quality of food at restaurants around commuter line stations in Central Jakarta. ***Materials and Method.*** A cross sectional study was conducted among 51 food handlers in Central Jakarta. Research data were analyzed using bivariate analysis with chi square test and multivariate analysis with logistic regression. ***Results.*** Bivariate analysis showed significant correlation between food ingredients (p= 0,019: OR = 5,600: CI 95% 1,487-21,096), food ingredients storage (p= 0,006: OR = 7,000: CI 95% 1,859-26,365), and cooked food storage (p= 0,008: OR = 6,250: CI 95% 1,768-22,092) with *E. coli* contamination in foods. In addition, multivariate analysis indicated that food ingredients (OR=7,915) and cooked foods storage (OR=8,402) affected *E. coli* contamination in foods. ***Conclusion*** Authors suggest the restaurant owners should also improve their restaurant facilities such as kitchen renovation and washstand provision as the supporting elements to improve the quality of foods.

Keywords*: hygiene sanitation, E. coli bacteria quality, restaurants*

INTRODUCTION

People's lifestyle is shifting as the urbanization and industrialization develop. It includes the habit to buy food from the restaurants or street foods.[1] Unhygienic food processing in such places may cause food contamination by the bacteria which could lead to foodborne disease.[2]

Foodborne disease is a global public health problem with high morbidity and mortality rate.[3] Foodborne disease might be caused by unhygienic food handling practices.[4] The standard of hygienic foods can be measured based on the evaluation of E.coli bacteria contamination in food.[3]

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E. coli bacteria is a normal microflora inhabiting the digestive tract of humans and warm-blooded animals which is usually non-pathogenic to humans.[5] However, several types of *E. coli* could be pathogenic and its presence in foods indicating that the foods are contaminated by feces. *E.coli* bacteria in foods indicates the poor hygiene during food production or processing.[6]

KA Commuter line is a commuter rail system for Jakarta Metropolitan Area in Indonesia. Commuter train station is one of the popular public spots with average number of users per day reaching 993,804 passenger on weekdays, and the the largest number of users served in a single day recorded is 1,065,522.[7] Based on the assessment result conducted by the Directorate of Environmental Health and Indonesian Railways Company in June 2017, 23% of food outlets at the station did not qualify the hygiene and sanitation requirements.[8]

According to the survey conducted at all commuter line stations in Jakarta, restaurants are the most dominant type of food, especially in Central Jakarta.

Central Jakarta is a strategic area where the National and Provincial Government runs. In addition, Central Jakarta also serves as a center of services, business, trade activities; which causes high activities in that area.[9]

The risk of foodborne disease is increasing as the people frequently eat and buy foods at the restaurants around the commuter line stations that did not properly follow the regulation to maintain the food hygiene or cook the foods in places with poor hygiene. Knowing that a research on the restaurants around commuter line station of Central Jakarta has never been conducted, the researchers are intended to identify *E. coli* contamination at the restaurants around commuter line train stations of Central Jakarta and its correlation with food hygiene and sanitation.

MATERIALS AND METHOD

The research design was cross-sectional with quantitative approach. The quality of *E. coli* bacteria on foods at the restaurants was determined through a direct food sampling and laboratory test using Total Plate Count (TPC) method with CCA (Chromocult Coliform Agar) as the medium. The data related to sanitary hygiene knowledge of the handlers was conducted through interview using questionnaires. While the data containing personal hygiene of the handlers, sanitation facilities, kitchen sanitation, utensils sanitation, food ingredients, food ingredients storage, food processing, cooked food storage and serving was conducted using checklist instrument according to the observations.

The Research used total sampling technique with inclusion is restaurants around Central Jakarta commuter line stations that had high risk contamination foods including *E. coli*, that is the food with high protein and water rate. The samples of this research were 51 food handlers and 51 food samples.

The data were analyzed using univariate, bivariate, and multivariate analysis with SPSS Statistic 19 software. Univariate and bivariate tests were performed to obtain the frequency distribution of each research variable and to determine the correlation between independent and dependent variables in 95% confidence interval. In addition, a multivariate test was performed to determine the most dominant independent variable that affect dependent variable.

FINDINGS

Based on the results of *E. coli* examination in the laboratory, 18 (35.3%) of the food was positively contaminated with *E. coli*.

This research shows that from 51 interviewed food handlers, there were 9 (17.6%) food handlers having poor knowledge and 34 (66.7%) food handlers having poor personal hygiene. The results show that 14 (27.5%) restaurants had unqualified food ingredients.

	Knowledge	Personal Hygiene	Ingredients	Ingredients Storage	Food Processing	Food Storage	Food Serving	Kitchen	Sanitation Facilities	Utensils Sanitation
Qualified	42 (82.4%)	17 (33.3%)	37 (72.5%)	26 (51%)	21 (41.2%)	31 (60.8%)	33 (64.7%)	16 (31.4%)	23 (45.1%)	26 (51%)
Unqualified	9 (17.6%)	34 (66.7%)	14 (27.5%)	25 (49%)	30 (58.8%)	20 (39.2%)	18 (35.3%)	35 (68.6%)	28 (54.9%)	25 (49%)

From the univariate test results of hygiene sanitation of food ingredients storage, there were 25 (49.0%) restaurants that did not qualify the hygiene sanitation standard. For food processing variable, 30 (58.8%) were not qualified the standard and 20 (39.2%) of food storage were not qualified the standard.

As much as 18 (35.3%) restaurants did not qualify the hygiene sanitation requirements for serving foods. There were 35 restaurants (68.6%) that did not qualify the kitchen sanitation hygiene. While as much as 28 restaurants (54.9%) had poor sanitation facilities and 25 (49.0%) restaurants did not qualify hygiene standards for utensils sanitation **(Fig.1)**.

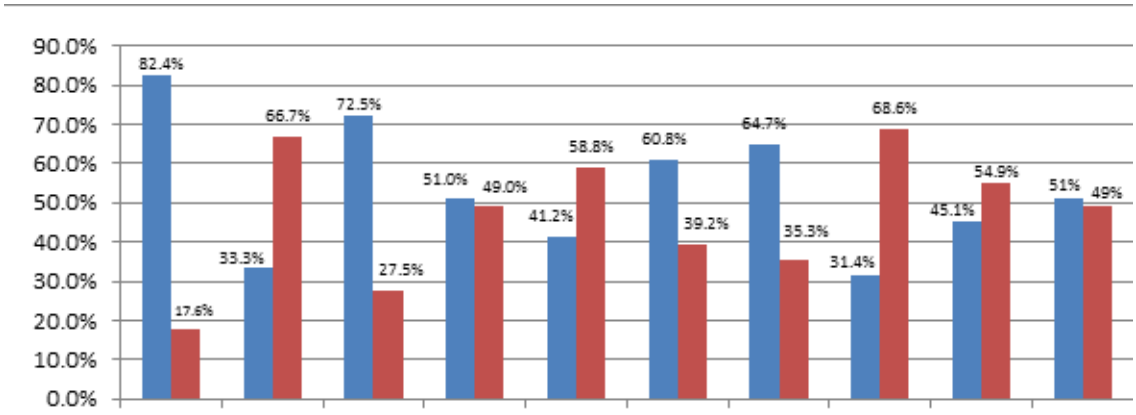

Fig 1. Univariate Analysis on Food Hygiene Sanitation Variables at the Restaurants around Commuter line of Central Jakarta, 2018

Bivariate analysis was conducted to assess the correlation between hygiene sanitation of foods variables and *E. coli* contamination at the restaurants. From the results of chi-square test, the correlation among both variables can be examined by looking at the *p* value and Odd Ratio (OR). If the value of $p < 0.05$ and OR > 1, then both variables have a significant correlation. Based on Chi-square test results, there is a significant correlation between food ingredients (p = 0,019: OR = 5,600: CI 95% 1,487-21,096), food ingredients storage (p= 0,006: OR = 7,000: CI 95% 1,859-26,365), and food storage (p= 0,008: OR = 6,250: CI 95% 1.768-22.092) with *E. coli* contamination. Multivariate analysis was conducted to determine the most dominant variable. The variables included in the multivariate analysis were variables that having *p* <0,25 based on the bivariate test.

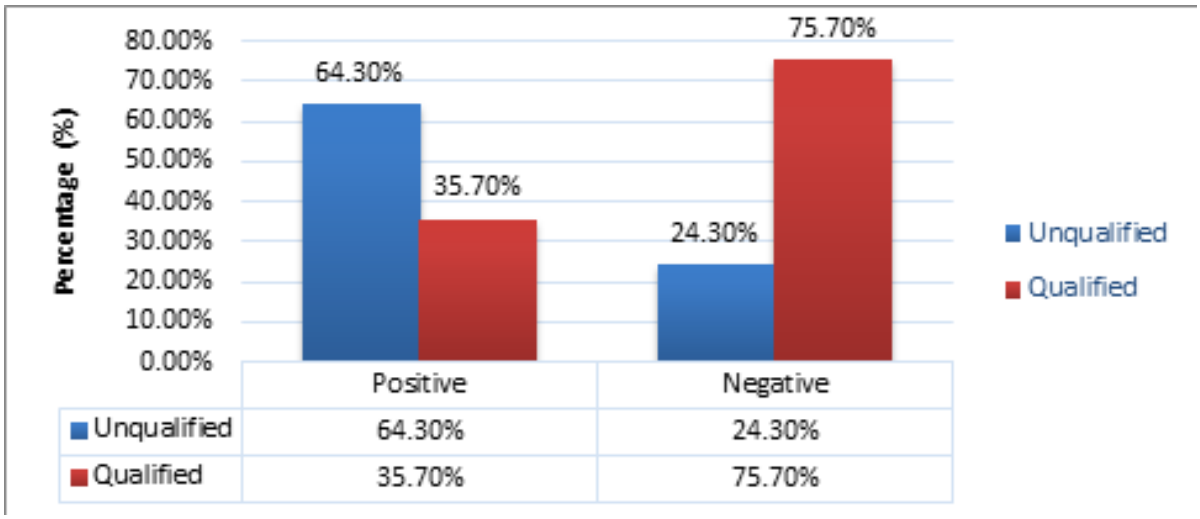

Fig 2. Correlation between Food Ingredients and *E. coli* Contamination at the Restaurants around Commuter line of Central Jakarta, 2018

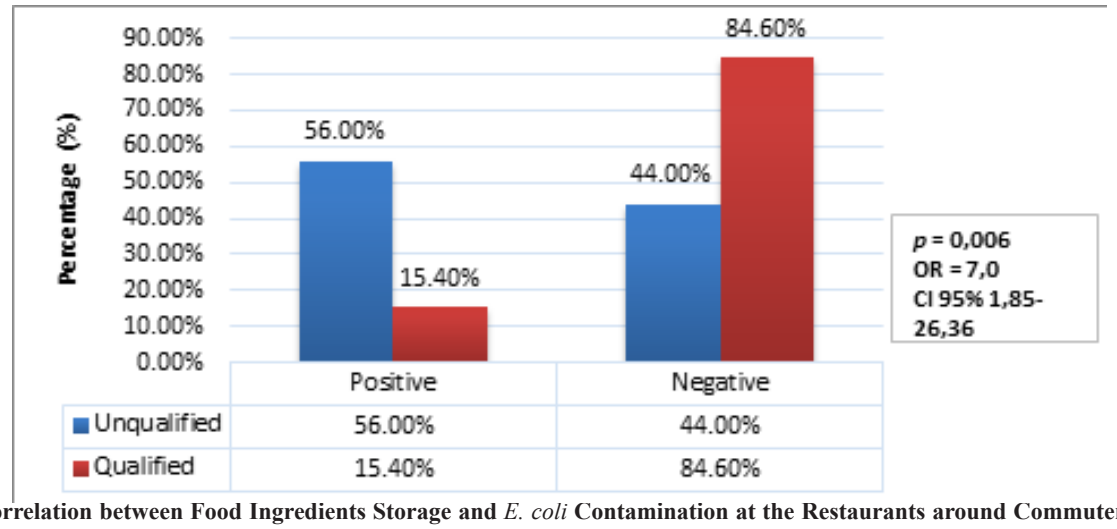

Fig 3. Correlation between Food Ingredients Storage and *E. coli* Contamination at the Restaurants around Commuter line of Central Jakarta, 2018

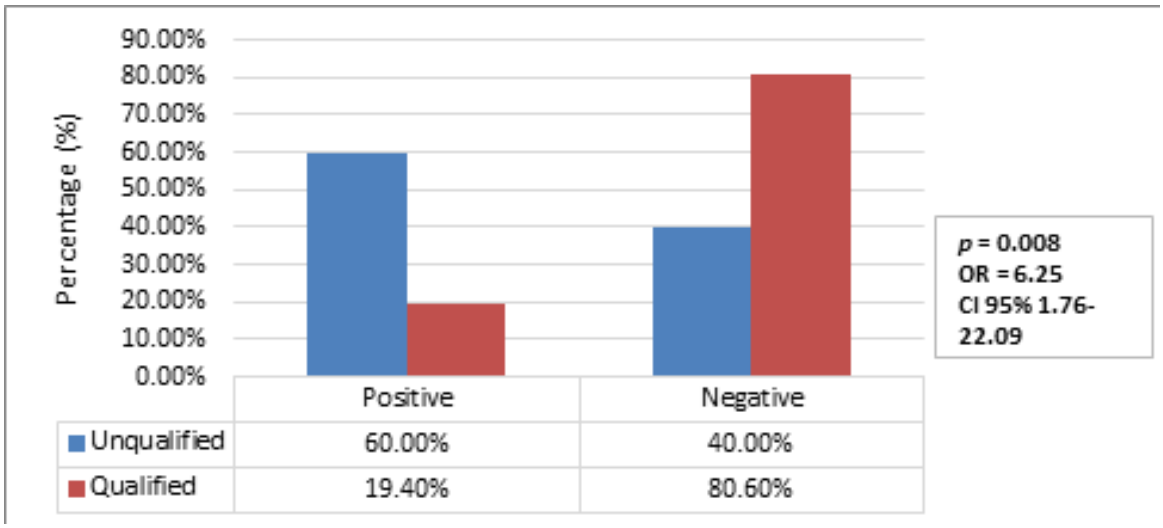

Fig 4. . Correlation between Food Storage and *E. coli* Contamination at the Restaurants around Commuter line of Central Jakarta, 2018

From the final result of multivariate analysis using logistic regression by removing the variable with p> 0.05, it is known the variables that having correlation with *E. coli* contamination at the restaurant are food ingredients (p = 0.010: OR = 7,915: CI 95% 1,638-38,591) and cooked food storage (p= 0,005: OR = 8,402: CI 95% 1,929-36,591). Food storage variable is the most significant factor since it has the largest OR value. From the logistic regression result, the equation of regression logistic model is as follows :

B value on food ingredients (b_1x_1), cooked food storage (b_2x_2) variables, and Constant (a), so that the equation is as follows (**Equation 1)**

$$\text{Logit } (y) = a + b_1x_1 + b_2x_2$$

B value on food ingredients (b_1x_1), cooked food storage (b_2x_2) variables, and Constant (a), so that the equation is as follows (**Equation 1)**

Logit (E. coli bacteria quality) = - 2,208 + 2,096 (food ingredients) + 2,128 (cooked food storage)

After the logistic regression test, the next step was interaction test. Interaction test was conducted to determine whether or not there is a substantial interaction among the independent variables. From the test, there is no interaction among independent variable.

The research results show that 18 food samples (35.3 %) are positively contaminated with *E. coli* bacteria. The Government has regulated about restaurant hygiene sanitation on the Regulation of Minister Health 1098/MENKES/SK/VII/2003 listed the level of *E. coli* bacteria on food is 0/gr.[10] Refferring to it, this research indicates that 35.3% of food samples are not safe to eat since they are contaminated with *E. coli* bacteria.

E.coli bacteria on foods can be prevented by conducting good hygiene sanitation practices and the implementation of HACCP (Hazard Analysis and Critical Control Points).[5] HACCP is one of the systematic approaches to identify and assess the hazards and risks that may arise during the production process.[11] A good hygiene and sanitation of food can be implemented by always maintaining personal hygiene, separating the food ingredients with the cooked one, cooking properly and maintaining the appropriate temperature for each type of foods as well as using clean water for cooking purpose.[12]

The quality of food ingredients has an important role in determining the food quality to be produced.[13] There are 14 (27.4%) unqualified food ingredients and 9 (64.2%) of them are caused by *E. coli* bacteria contamination. Based on the analysis result, food ingredients are correlated with *E. coli* bacteria contamination in foods at the restaurants. Unsafe food ingredients are 5.6 times higher to be contaminated by *E. coli* compared to safe ingredients.

The food ingredients should be purchased from trusted suppliers, which are registered and licensed.[14] In this research, it was found that 3 (5.9%) restaurants did not purchase their ingredients from licensed suppliers. In addition, the physical conditions of the ingredients should be also considered by selecting the fresh ingredients and having no sign of rot, as well as no color and shape changing. If the ingredients are in packaging form such as ketchup and soy sauce, the costumers should check the label registered on MoH RI.[10] The research also found 6 (11.8%) packaged food ingredients are unregistered on MoH RI and did not have labels and brands.

The results show that there are 25 (49%) cases of improper ingredients storage and 14 (56%) of them resulting foods contaminated with *E. coli* bacteria. Based on analysis result, food ingredients storage are correlated with *E. coli* bacteria contamination on foods at the restaurants. Improper food ingredients storage has 7 times risks higher to be contaminated with *E. coli* compared to the one qualifying the standard.

Based on the observation, the restaurant owners purchase their food ingredients every day. However, not all of the ingredients were used at that day, so there are several types of ingredients stored up to the next day. The system of FIFO (First In First Out) can be implemented by writing up the purchasing date of each item and use it according to the purchase date.[15]

Temperature control is also important in food storage because bacteria can grow faster at critical temperatures or inappropriate temperatures.[14] Based on the observation, there were 14 (27.5%) restaurants that did not have refrigerator for storing the foods that are easily spoiled. It led to the finding of several types of spoiled ingredients such as rotten chillies and moldy vegetables. Therefore, the control to the usage period of ingredients should be taken into account, especially for the restaurants that do not have refrigerator.[16]

Food ingredients storage should be protected from contamination sources such as insects and rodents, while the placement should be separated from the cooked foods. However, it was found that 16 (31.4%) restaurants storing their ingredients together with the cooked food.

The results show that there were 20 (39.2%) restaurants having poor food storage and 12 (60%) of them are contaminated with *E. coli* bacteria. Based on analysis result, foods storage is correlated with *E. coli* contamination on foods at the restaurants. Inappropriate food storages can increase the risk of E. coli bacteria contamination on foods, 6.25 higher than the good food storage.

In addition, cooked food storage also require a proper handling to prevent food contamination.[6] Proper food storage can control the bacterial growth.[17] Based on the observation result, 27 (52.9%) restaurants did not store their foods in a closed food display. Consequently, the foods were not protected from vermin such as cockroaches, flies, and rats.

In this research, the samples were foods with high protein and water content which is favored by the bacteria and also known as fast spoiled foods. Therefore, the storage needs to be considered importantly as well as the storage period.[18] The longer food is stored, the higher the risk of spoiled foods occurence. If the foods are stored for more than 4-6 hours, then it should be kept in cold temperature and reheated for serving.[16]

CONCLUSION

Based on the research results, 18 (35.3%) types of food are positively contaminated with *E. coli*. Research also shows that there is a statistically significant correlation between food ingredients, food ingredients storage, and cooked food storage variables with *E. coli* bacteria food contamination at the restaurants. Multivariate analysis shows that there are two factors affecting E. coli contamination on foods, i.e. factors of food ingredients and shared food storage.

Efforts to improve hygiene and sanitation in restaurants can be performed by the cooperation of related parties such as Public Health Office and Health Department with the restaurant owners by conducting training and counseling for food handlers regarding good hygiene sanitation practices by implementing HACCP system. In addition, sticker attachments program may also be implemented to restaurants that meet the requirements on sanitary hygiene inspection and monitoring. Moreover, the restaurant owners should also improve their restaurant facilities such as kitchen renovation and washstand provision as the supporting elements to improve the quality of foods.

Conflict of Interest: There is no conflict of interest for this research.

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Ethical Clearance: This research‘s number of ethical approval from the Ethical Research Committee is 184/UN2.F10/PPM.00.02/2018 dated March 19th 2018.

REFERENCES

1. Sheth M, Gupta A, Ambegaonkar T. Handlers' hygiene practices in small restaurants of Vadodara. J. Nutrition & Food Science 2011; 41: 386–392. Doi : 10.1108/00346651111181930
2. Abdul-Mutalib N, Abdul-Rashid M, Mustafa S, Amin-Nordin S, Hamat R A, Osman M. Knowledge, attitude and practices regarding food hygiene and sanitation of food handlers in Kuala Pilah, Malaysia. J. Food Control 2012; 27: 289–293. Doi : 10.1016/j.foodcont.2012.04.001
3. Baluka S, Miller R, Kaneene B. Hygiene practices and food contamination in managed food service facilities in Uganda. African J. Food Science 2015; 9: 31-42. Doi: 10.5897/AJFS2014.1170.
4. Park S, Kwak T, Chang H. Evaluation of the food safety training for food handlers in restaurant operations. J. Nutrition Research and Practice 2010; 4: 58-68. Doi : 10.4162/nrp.2010.4.1.58
5. Food and Agriculture Organization (FAO). Preventing E.coli in Food. United State: The Food Chain Crisis Management Framework (FCC) 2011.
6. Atnafie B, Paulos D, Abera M, Tefera G, Hailu D, Kasaye S, Amenu K. Occurrence of Escherichia coli O157:H7 in cattle feces and contamination of carcass and various contact surfaces in abattoir and butcher shops of Hawassa, Ethiopia. BMC Microbiology 2017; 17: 24. Doi : 10.1186/s12866-017-0938-1
7. Commuterline Indonesia. General information about PT.Commuterline Indonesia 2017. Central Jakarta: PT. Commuterline Indonesia 2017. Available from : http://www.krl.co.id/ [Cited: March 2018].
8. The Ministry of Health Republic Indonesia. Stikerisasi Food Processing Sites at the Station. Jakarta: Directorate General of Public Health 2017. Available from: http://www.kesmas.kemkes.go.id/portal/konten/~rilis-berita/092512-stikerisasi-tpm-di-stasiun [Cited: March 2018].
9. Central Jakarta Administration City Government. Central Jakarta City Government Profile. Central Jakarta: Central Jakarta Communication and Information Agency. Available from:https://pusat.jakarta.go.id/?cmd=web&mod= main&section=gov& action=profile [Cited: April 2018]
10. Minister of Health Republic Indonesia. Decree of the Minister of Health of the Republic Indonesia Number 1098/MENKES/SK/VII/2003 concerning Sanitary Sanitation Requirements for Restaurants.
11. International Flight Sevices Association (IFSA).

World Food Safety Guidlines for Airline Catering 2016. Atlanta : IFSA World Food Safety Guidelines 4th Version.

12. World Health Organization (WHO). Five Keys to Safer Food Manual. Switzerland: WHO Library Cataloguing in Publication Data 2016
13. BC Cook Articulation Committee. Food Safety, Sanitation, and Personal Hygiene. BC Cook Articulation Committee CC-BY 4.0 Int License 2016.
14. Saccol A, Serafim A, Heckttheuer L, Medeiros L, Spinelli M, Abreu E, Chaud D. Hygiene and sanitary conditions in self-service restaurants in São Paulo, Brazil. J. Food Control 2013; 33: 301–305. Doi : 10.1016/j.foodcont.2013.02.030
15. Yardimci H, Hakli G, Cakiroglu F, Ozcelik A. Hygiene Knowledge of Food Staff in Catering Industry: A Sample From Turkey. SAGE Open J 2015; 5: 1-7. Doi : 10.1177/2158244015580376
16. Schmidt R, Rodrick G. Food Sadety Handbook. New Jersey : A John Wiley & Sons Publication 2003
17. Hobbs B. Food poisoning and food hygiene. New Delhi: Indian Agricultural Research Institute 1968. Available From : http://www.cabdirect.org/abstracts/19692700301.html [Cited: May 2018]. BC Cook Articulation Committee. Food Safety, Sanitation, and Personal Hygiene. BC Cook Articulation Committee CC-BY 4.0 Int License 2016.
18. ChildSafe. Safe Food Handling. Australia: ChildSafe Safety Management System

Focal Interictal Epileptiform Discharges in Idiopathic Generalized Epilepsies

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ABSTRACT

Background and objective: Idiopathic Generalized epilepsies (IGE) constitutes 15-20% of all epilepsies in adult and children. IGEs are electroclinical syndromes sharing specific clinical and EEG features, with their seizure phenotypes indicate the involvement of both hemispheres from the onset, both clinically and electrographically. Their EEG expression consists of initially generalized, bilaterally symmetrical discharges, whereas the background patterns are normal for age. We aimed to look at the presence of focal interictal EEG abnormalities in idiopathic generalized epilepsies and further analyze their characteristics, obviating misdiagnosis of focal epilepsy because of their presence.

Method: about 109 patient diagnosed as IGE enrolled in prolonged EEG. Focal EEG discharged were defined IEDs according to" The American Clinical Neurophysiology Society's Standardized Critical Care EEG terminology", further analyzed and correlated with different IGE subtypes, and with other clinical and EEG variables.

Results: About one third (34.8%) of the patients had focal IEDs, most of them were JME subtype. Location of most (65.8%) was frontal, the pattern of occurrence was frequent in (50.0%), (81.4%) were affected by provocative manoeuvres.

Conclusion: Focal interictal epileptiform discharges found in one third in EEG of idiopathic generalized epilepsies, they are frequent, and there is a high possibility of their appearance in routine EEGs.

Keywords: *Epileptiform, Epilepsy, Focal, Idiopathic, Interictal*

INTRODUCTION

A seizure is defined as "a transient occurrence of signs and/or symptoms due to abnormal excessive or synchronous neuronal activity in the brain [(1)]. The seizures are either generalized or focal. Generalized epileptic seizures are conceptualized as originating at some point within, and rapidly engaging, bilaterally distributed networks. They can include cortical and subcortical structures but do not necessarily include the entire cortex. Whereas, focal epileptic seizures are conceptualized as originating within networks limited to one hemisphere. These may be discretely localized or more widely distributed [(2)].

Idiopathic generalized epilepsies (IGEs) are electroclinical syndromes sharing specific clinical and electroencephalographic (EEG) features, with their seizure phenotypes indicate the involvement of both hemispheres from the onset, both clinically and electrographically [(3)]. Focal clinical, electroencephalographic, and neuropathological features of IGE have been reported. The study of these focal electroencephalographic abnormalities is not devoted of clinical importance. Focal abnormalities especially focal interictal epileptiform discharge (IED) could potentially

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lead to delayed diagnosis and misdiagnosis of IGE as focal epilepsy resulting in inappropriate antiepileptic drugs (AEDs) Choice and it may be a predictor of the clinical behaviour of the IGE syndrome [4, 5]. The IGE show no evidence of structural brain lesions, in contrast to the secondarily generalized group of epilepsies, and no known or suspected aetiology other than the contributions of polygenic factors. Their EEG expression (ictally or interictally) consists of initially generalized, bilaterally symmetrical discharges, whereas the background patterns are normal for age [2]. IGE constitutes 15-20% of all epilepsies in adult and children cohorts [6]. We aimed in this study to look over the presence of focal interictal EEG abnormalities in idiopathic generalized epilepsies and further analyze their characteristics, obviating misdiagnosis of focal epilepsy because of their presence.

METHOD

A cross-sectional observational study conducted at the epilepsy clinic of Baghdad Teaching Hospital for the period from Oct 2016 to Oct 2017, the study involved One hundred and nine patients who were diagnosed as IGE in the epilepsy clinic of Baghdad Teaching hospital, and they were classified as IGE according to the ILAE 2001 [7]. Clinical history and examination, MRI (epilepsy protocol with 3 Tesla techniques), biochemical investigation, the neuropsychological assessment were all reviewed when available. The study received institutional approval from the Iraqi Council of Medical specialization and was done in accordance with Helinesky Declaration.

Patients included if they have seizure phenotypes according to ILAE2001 classification, EEGS with interictal bilateral, synchronous S/W polyspike wave normal background, normal neurologic examination and normal 3-Tesla brain MRI. The exclusion criteria were history of complex febrile convulsions, subjects with status or convulsions (>I5 min) If those occurred before or during the study, previous history of CNS infection, patients with abnormal neurological examination, clear evidence of cognitive dysfunction (however no specific test was, performed only depending on routine clinical history and examination), patients with aura or any focal features in seizure semiology, brain structural abnormality on MRI.

Long-term EEG recording (3 hours) was done for all patients in video EEG unit using, Nicollet ™ VikingQuest Desktop, (code: NCM12503, CareFusion v32 channel), Silver disc electrodes "sPes media (SA)" – Italy, were used. According to the modified 10-20 international system of electrode placement by the addition of 10 extra electrodes, 6 in the inferior temporal areas, inferior temporal chains, left side F9T9P9 on right side F10T10P10 electrodes), 2 anterior temporal electrodes T1T2 in some patients and 2 EKG electrodes [8]. Scalp skin prepared, using Nuprep skin preparation gel (Weaver and Company, A0006 rev.07 .USA) and electrode attached using Ten20 EEG paste (Wavear and Company: A0002 rev.06: USA) for all patients.

Figure 1: Headbox

The electrode impedance was kept below 5 K ohm. All EEGs were carried out under normal standard conditions, i.e., with the patient relaxed, awake with eyes closed, eye-opening and eye closure during which lying supine in a quiet room. All patients were partially sleep deprived, the usual dose of their anti-epileptic drugs (AEDs) was regularly taken.

Provocation manoeuvres include:

Hyperventilation: By asking the patient to breathe deeply at a rate of 20 breath / min for 3 min; sometimes even for 5 min patient sitting; the procedure was done for age older than 3 years [9], when needed the hyperventilation was repeated after 20 min from sleep at the moment of arousal (HV in drowsiness) [10].

Intermittent photic stimulation: Awake with dim room light simultaneous video record was recruited. Lump intensity of 1 joule a distance of 30 cm. patient instructed to look at the centre of the lump, IPS sensitivity was determined in three eye conditions with separate trains of flashes of 5 sec duration each during

eye closure, eyes closed, and eyes open. The following flash frequencies used separately and in this order – 2 – 8 – 10 – 15 – 18 – 20 – 25 – 40 – 50 – 60 Hz. If there was a generalized response at a certain frequency the lower and upper threshold for the response was defined [8].

The patients were categorized into two groups; one with focal IEDs and the other does not have focal IEDs. Both groups were compared regarding the syndrome, clinical data including age, age at disease onset, disease duration, family history of epilepsy, syndrome type, frequency and timing and no of AEDs.

Statistical analysis

Data tabulation, input and coding, were done by the use of IBM© SPSS© (Statistical Package for the Social Sciences) Statistics Version 22 (Chicago, IL) and Epi Info™ 7. For descriptive statistics, the percentage was applied, Chi-square was used, and non-parametric test (Mann-Whitney) test was used for numerical data that did not follow a normal distribution and T-test for normally distributed data. Z-score; the difference between two samples proportions was used. A p-value less than 0.05 was considered significant throughout data analysis.

RESULTS

This study enrolled 109 patients; their mean age was 22.78 ± 10.24 years, with 43 (39.4%) male versus 66 (60.6%) females, as illustrated in table 1.

From total 38 patients, 11 had focal IEDs without provocative tests. In The rest 27 patients focal IEDS enhanced by the propagative tests 27 (27.55%), and the difference between the two proportions was found to be statistically significant (p-value < 0.001), which meant that propagative tests was an important tool to show focal IEDS Most patients showed focal IEDS on REM sleep 22 (81.47%), 2 (7.40%) on HV, and 3 (11.12%) on IPS, as illustrated in table 2.

Mixed SWD had 5.7 folds increase the risk of having focal Epileptiform Discharge compared to symmetrical SWD, and it was statistically significant, while asymmetrical SWD had a slight increase in the risk of focal Epileptiform Discharge compared to symmetrical SWD but it not statistically significant, as illustrated in table 2.

This study did not show the statistically significant difference between IGE subtypes and focal IEDS presence (see table 3).

Table 1: Relationship between Focal Epileptiform Discharge and various predictors

Variables	Focal IEDS		p-value
	Positive (38)	Negative (71)	
Age (years), mean ± SD	20.55 ± 8.35	23.97 ± 11.00	0.072 [a]
Male, number (%)	15 (39.4%)	28 (39.4%)	0.997 [b]
Positive family history, number (%)	13 (34.2%)	18 (25.3%)	0.329 [b]
Age of Onset (yeas), mean ± SD	13.58 ± 5.89	13.16 ± 5.93	0.727 [a]
Duration (years), mean ± SD	7.05 ± 6.35	7.05 ± 6.35	0.275 [c]
Seizure frequency, mean ± SD	2.20 ± 2.37	4.32 ± 5.84	0.123 [c]
AED number, mean ± SD	1.45 ± 0.60	1.21 ± 0.41	0.016 [a]
[an] Independent t-test, [b] chi-square test, [c] Mann Whitney U test			

Table 2: Effect of propagative tests on focal IEDS in IGE

Predictors	Focal IEDS (38)	p-value
Provocative tests		<0.001
Without	11 (28.9%)	
With	27 (71.1%)	
REM sleep 22 (57.9%), HV 2 (5.2%), and IPS 3 (7.9%) Z-test used (= -3.24)		

Table 3: association between Focal Epileptiform Discharge and its possible predictors

Predictors	Focal IEDS		OR (95%CI)	p-value
	Positive (38)	**Negative (71)**		
SWD				
Symmetrical	17 (44.7%)	49 (69.0%)	5.765 (1.994-16.670)	0.001
Asymmetrical	7 (18.4%)	15 (21.1%)	1.345 (0.469-3.856)	0.581
Mixed	14 (36.8%)	7 (9.9%)	1.0	-
Type of ICE				
CAE	5 (13.2%)	8 (11.3%)	1.193 (0.405-3.587)	0.765
JME	13 (34.2%)	28 (39.4%)	0.799 (0.341-1.869)	0.680
JAE	9 (23.7%)	22 (31.0%)	0.507 (0.296-1.675)	0.420
GTCS alone	9 (23.7%)	8 (11.3%)	2.444 (0.868-7.294)	0.088
EMA	0 (0.0%)	3 (4.2%)	-	0.550
Binary logistic regression analysis				

DISCUSSION

In the current study the overall incidence of focal IEDS was 38.4%, which was quite comparable to a large number of studies on this topic; on the other hand, it was higher than, and lower than some others. Focal IEDs was 34% in a study of adults with proven absences [11], and 35% in another study in IGEs [3], and 30-35% in a study done on JME patient. Other work is done showing 38% the rate of focal IEDs in EEG of IGE Patients. The rate of 16 -37% of patients with absence had focal IEDS [12]. Even though higher per cent's, 56% was observed in a study done on patients with primary generalized epilepsy monitored for two decades [13], while a study detected 91% of 11 children with CAE had Focal EEG features [14], another study showed 47% of 41 patients had focal interictal epileptiform discharges [15]. The dissimilarity between the studies highly related to patients character, sample size, a period of the study, protocol and time of recording, inclusions and exclusion criteria and syndrome vs seizure choice.

Results maybe anecdotal if criteria of patient's selection were not harsh, as for previous CNS infections, head trauma, or patients with coexistence of clinical focal seizure elements. The elimination of frontal absences and EEGs with the phenomena of secondary bilateral synchrony in this study affected the no of records with focal IEDSs, but Focal IEDs the selection and allowed to confidently address the sample as idiopathic Standards of our work in nominating the activity as focal keeps out the asymmetrical SWDs and lateralized SWDs, this is in distinctions to other studies [13], who allowed for those to be labeled as focal EEG features.

In the current study age, the age of onset and family history failed to elicit differences between focal IEDS presence and absence; this is compatible with studies done on the same points [11, 15].

This study established the statistically important difference between patients with focal IEDS in the record, having more number of AEDs than patients with no focal IEDS. This detailed information about the type

of medication and possible interaction with their impact on the EEG may be needed to be studied to doubtlessly decide basis of the relation between focal IEDS and no. of AEDs. Studies pointed to the relation of the existence of focal IEDS and polytherapy in JME patient [16, 17]. The difference between these studies and our work is the IGE subtypes which included. In which we employed ILAE task force classification 2001, which included updates in some syndromes in IGE phenotypes than ILAE 1989, e.g., EGTCS- alone which allow the studying of GTCS not necessarily at waking, to establish that focal discharges results in appropriate AED choice leading to poor seizure control and hence polytherapy.

Focal IEDS in IGE is highly state-dependent, and it affected by provocative tests in distinguished degree. The effect was in the form of increased amplitude and frequency, not affecting its field. Only 11 patients out of 38 their FOCAL IEDS was found regardless of provocative tests. Effect of sleep and HV were studied by S Koutroumanidis, M showing similar results [14].

Patients with asymmetrical GSWD associated with focal IEDs than patient with symmetrical GSWD, voltage asymmetry between both hemispheres regional in well-known feature of GSWD of IGEs. Usually, occur during non-REM sleep and called fragmented SWD, drawback on our work was that state of each patient with asymmetrical GSWD was not labelled to analyze the information we observed. Could this focal IEDSs especially when are focal spike slow wave complexes are fragmented GSWD.

Studying focal feature in different IGE domain showed JME to be the most subtype with focal IEDS, (34.2%). Followed by JAE (23.7%), GTA (23.7%), CAE (13.2%), EMEA (5.3%). Results might be different from the only few studies which investigated each IGE subtype separately. A study on patients with absence seizure found JAE most common IGE subtype with focal IEDS [11]. Another found GTCSA the most common IGE subtype with focal IEDS [15]. However, this difference could be explained by that their small sample size which compared ours and that not all IGE subtypes were included. In general focal IEDS in IGE studied as a whole category [12] or taking only one syndrome like [14, 18] or selecting patients with IGE with specific seizure semiology [11].

CONCLUSIONS & RECOMMENDATIONS

Focal IEDs are almost present in one-third of the records of IGE's EEG. They are frequent, and there is a high possibility of their appearance in routine EEG. Further studies on the correlation of the presence of these focal discharges with the clinical behaviour in the setting of seizure frequency in each sub-syndrome and responses to AEDs.

Conflict of Interest: None

Ethical Clearance: Informed written consent obtained from all the participants in the study, and the study and all its procedure were done by the Helsinki Declaration of 1975, as revised in 2000. The Iraqi Council of Medical specialization approved the study

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REFERENCES

1. Fisher RS, van Emde Boas W, Blume W, Elger C, Genton P, Lee P, et al. Epileptic seizures and epilepsy: definitions proposed by the International League Against Epilepsy (ILAE) and the International Bureau for Epilepsy (IBE). Epilepsia. 2005;46(4):470-2.
2. Berg AT, Berkovic SF, Brodie MJ, Buchhalter J, Cross JH, van Emde Boas W, et al. Revised terminology and concepts for organization of seizures and epilepsies: report of the ILAE Commission on Classification and Terminology, 2005-2009. Epilepsia. 2010;51(4):676-85.
3. Roger J, Dreifuss, F. Martinez-Lage, M. Proposal for revised classification of epilepsies and epileptic syndromes. Commission on Classification and Terminology of the International League Against Epilepsy. Epilepsia. 1989;30(4):389-99.
4. Panayiotopoulos CP, Obeid T, Tahan AR. Juvenile myoclonic epilepsy: a 5-year prospective study. Epilepsia. 1994;35(2):285-96.
5. Yahya RN, Kasim AA, AlGawwam G, A. Fawzi H. Treatment satisfaction with disease-modifying therapy in relapsing-remitting multiple sclerosis in Iraq. International Journal of Research in Pharmaceutical Sciences. 2018;9(3):836-43.
6. Jallon P, Latour P. Epidemiology of idiopathic generalized epilepsies. Epilepsia. 2005;46 Suppl

9:10-4.

7. Engel J, Jr. A proposed diagnostic scheme for people with epileptic seizures and with epilepsy: report of the ILAE Task Force on Classification and Terminology. Epilepsia. 2001;42(6):796-803.
8. Kasteleijn-Nolst Trenite D, Rubboli G, Hirsch E, Martins da Silva A, Seri S, Wilkins A, et al. Methodology of photic stimulation revisited: updated European algorithm for visual stimulation in the EEG laboratory. Epilepsia. 2012;53(1):16-24.
9. Kakisaka Y, Alexopoulos AV, Gupta A, Wang ZI, Mosher JC, Iwasaki M, et al. Generalized 3 Hz spike-and-wave complexes emanating from focal epileptic activity in pediatric patients. Epilepsy & behavior : E&B. 2011;20(1):103-6.
10. Seneviratne U, Cook MJ, D'Souza WJ. Electroencephalography in the Diagnosis of Genetic Generalized Epilepsy Syndromes. Frontiers in Neurology. 2017;8(499).
11. Matur Z, Baykan B, Bebek N, Gurses C, Altindag E, Gokyigit A. The evaluation of interictal focal EEG findings in adult patients with absence seizures. Seizure. 2009;18(5):352-8.
12. Aliberti V, Grunewald RA, Panayiotopoulos CP, Chroni E. Focal electroencephalographic abnormalities in juvenile myoclonic epilepsy. Epilepsia. 1994;35(2):297-301.
13. Lombroso CT. Consistent EEG focalities detected in subjects with primary generalized epilepsies monitored for two decades. Epilepsia. 1997;38(7):797-812.
14. Koutroumanidis M, Tsiptsios D, Kokkinos V, Kostopoulos GK. Focal and generalized EEG paroxysms in childhood absence epilepsy: topographic associations and distinctive behaviors during the first cycle of non-REM sleep. Epilepsia. 2012;53(5):840-9.
15. Esmail EH, Nawito AM, Labib DM, Basheer MA. Focal interictal epileptiform discharges in idiopathic generalized epilepsy. Neurological sciences : official journal of the Italian Neurological Society and of the Italian Society of Clinical Neurophysiology. 2016;37(7):1071-7.
16. Szaflarski JP, Lindsell CJ, Zakaria T, Banks C, Privitera MD. Seizure control in patients with idiopathic generalized epilepsies: EEG determinants of medication response. Epilepsy Behav. 2010;17(4):525-30.
17. Fernando-Dongas MC, Radtke RA, VanLandingham KE, Husain AM. Characteristics of valproic acid resistant juvenile myoclonic epilepsy. Seizure. 2000;9(6):385-8.
18. Biçer Gömceli Y, Kutlu G, Gönülal B, Ýnan LE. Prognostic role of focal clinical findings and electroencephalographic features of patients with juvenile myoclonic epilepsy. Journal of the Turkish Chapter of ILAE. 2012;18(1):19-25.

Quantitative Fire and Explosion Risk Assessment of Fuel Tanker Truck: Preliminary Case Study at Fuel Terminal X Jakarta

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ABSTRACT

The distributions of fuel using tanker truck have been increasing in terms of complex risks related to the potential of fire and explosion. Various studies and case reports have proven that the level of accidents or fire and explosions of fuel tanker trucks is rising. The objective of this study is to calculate personal and societal risk levels. Preliminary case study was conducted in filling shed of the Fuel Terminal X Jakarta. Data on locations, materials, meteorology hazard identification, activities and process, case reports, and installation were collected from measurements, observations, or interviews processes, as well as provided by the company and from existing literatures. Individual Risk per Annum (IRPA) for individual risk and Potential Loss of Life (PLL) for societal risk were calculated from frequency analysis using Event Tree Analysis (ETA). Furthermore, the consequences were analyzed using Areal Location of Hazardous Atmosphere (ALOHA® 5.4.4) software of fire and explosion based on a worst-case scenario modeling. The individual risk per year for office workers, field workers, society and road users were 4.16E-09; 6.99E-09; 1.73E-08 and 6.59E-13, respectively. The societal risk was 1.49×10^{-5} per year. Compared to the UK HSE Risk Criteria, the findings showed that the individual and societal risks of each category were still acceptable and tolerable.

Keywords: *Quantitative Risk Assessment (QRA); fire; explosion; tanker truck; fuel.*

INTRODUCTION

Dangerous chemicals, including oil and gas products, are distributed in enormous number daily. Center for Chemical Process Safety (CCPS), the transportation systems have the high potential to release the dangerous chemical material which has the effects for the society, property, and the environment[1]. In 2004, Major Hazard Incident Data Services/MHIDAS report states that 43% of 12,179 accidents occurred during the transportation process[2]. The hazardous chemical transportation volume in Europe between 1990-1998 show that its number reach 35 % of land transportation number. Cars are the main dangerous chemical transportation in Europe, and its number is expected to increase every year[3].

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The number of traffic accidents is seven times higher than railway or water accidents. Brenck and Mondry (1998) states that the accidents often happened to the transportation modes with the capacity exceeding 10,000 L[4]. German Federal Statistic Office (2000) reported that the traffic accident involving dangerous chemical transportation with or without the release's effects had caused injury and serious property damage. The study conducted in 1999 shows that most of the accidents involving dangerous chemical release (34 of 52 cases, or 65 %) occurred while transporting the materials under category 3 (combustible liquid)[5].

On 2011, crude oil uses amounted to 32.7 % of the total energy use in Indonesia. Those number increased by 4.04 % from 2010 and it is expected to increase every year[6]. Fire can cause an explosion and vice versa[7]. Fire, explosion, and environmental pollution are relevant with hydrocarbon industry, and they may cause financial loss and other damages [8,9].

Fuel oil transportation activities use various modes of transportation, including tanker trucks. In 2012, an explosion of a tanker truck killed 22 people and injured 111 people in Riyadh[10]. Similar to that case, on 29 August 1998, a tanker truck transporting 23,000 L of gasoline got into an accident in Zurich, causing fire and many injuries[11]. Unfortunately, there is no adequate relevant statistical data in Indonesia yet.

Center for Chemical Process Safety (CCPS) has created the guidelines for hazardous chemical transportation risk assessment. The assessment process includes determining the scenario and its incident potential, the consequence evaluation, the accident estimation, the accident's effects estimation, and the risk level estimation[1,12]. Fuel Terminal X is one of national company's fuel terminals involved in upstream and downstream oil and gas industries. Furthermore, the company is one of the largest companies with high frequency of fuel oil transportation activities.

Therefore, Quantitative Fire and Explosion Risk Assessment (*QFERA*) must be implemented as a proper precaution to determine and control the hazard and risk of fire and explosion in tanker trucks. The purpose of the study is to perform a fire and explosion quantitative risk assessment on fuel tankers to decide the most appropriate risks in one of the Fuel Terminal X Jakarta's case study.

METHOD

The preliminary case study was conducted at the Jakarta Fuel Terminal from April to July 2015. The object of research was in the form of a fuel tank with the largest capacity (40000 liters) transporting the premium fuel. Data concerning locations were collected using GPS. Meteorological data were generated from the Indonesian Agency for Meteorological, Climatological and Geophysics. Data concerning hazard identifications, chemical materials, tanker truck specifications, activities and process, case or accidents reports, employees record and company assets were collected from observation, and interview. Data were evaluated then analyzed using Quantitative Risk Assessment (QRA) method to determine the individual and societal risk levels. The data analysis was done by identifying the risks of fire and explosion, and then verifying the field to set a fire and explosion scenarios. Individual Risk per Annum (IRPA) of individual risk and Potential Loss of Life (PLL) of societal risk were calculated from frequency analysis using Event Tree Analysis (ETA). Furthermore, the consequences were analyzed using Areal Location of Hazardous Atmosphere (ALOHA® 5.4.4) software of fire and explosion based on a worst-case scenario modelling.

RESULTS

The tanker trucks in company X were managed by a third party with 13 subcontractors. The tanker trucks activities including loading, distributing and unloading. Every day, 240 units of tanker trucks distribute 6,000 KL of fuel. The distribution route covers Jakarta, Bogor, Depok, Tangerang, and Bekasi.

The fuel leakage from the tankers in the filling shed area is considered having a high-risk danger level. In fact, there has been a fire accident in the area. The filling process itself takes 1 hour. Fuel Terminal X Jakarta have 12 filing sheds, each of which can accommodate 3-6 tanker trucks. Therefore, every hour, almost 72 tanker trucks stand by in the area. Every tanker truck was operated by 1 driver and 1 crew who filled the tanker with fuel during loading process in the filling shed new gentry.

According to OSHA and NIOSH, Pentane density is 2.48 times higher than the air[13,14]. The baseline event is in accordance with the risk identification result, which is the leakage from the bottom loading valve in the tank with the rate of 4×10^{-5} per hour which is then converted to 6.08×10^{-4} per year. The immediate ignition probability is determined according to Purple Book (2005) for road tanker continuous, which is 0.1. The delayed ignition probability is 0.9 because it happened in the chemical plant area or oil refinery[15]. Another probability is determined in accordance with the observation result toward the existing fire safety system. The ETA result can happen if the scenario preconditions are fulfilled. The ETA frequency calculation can be used to calculate the risk level.

Table 1. The Summary of Risk Level Calculation According to Scenario

Scenario	Frequency	Type
Fire Ball	5,490E-05	Immediate Fire
BLEVE	2,890E-06	Immediate Fire
UVCE	4,213E-04	Explosion
Dispersion	4,928E-05	Dispersion
Flash Fire	2,341E-06	Delayed Fire

The fire and explosion risks calculation can be used to determine the worst-case scenario. The failure scenarios which are most likely to occur are: fire from the spreading flammable vapor cloud, thermal radiation from the flammable area, BLEVE, and vapor cloud explosion (VCE) (Table 1). The scenario modeling results are shown on Table 2.

The simulation results from some of the fire and explosion scenarios show that there is hazard potential that threaten the safety of the society around Fuel Terminal X Jakarta. Fuel Terminal X Jakarta, which is located at Koja District, North Jakarta, occupies 483,520,000 m^2 of land area. Individual and societal risks assessments using population data from the area show that the population density is 10,811.78 people/km^2 in 2013. The assumed numbers of daily public transportation users in the area in 2013 amounted to 20,971 people/day[16].

Table 2. The Consequences Modeling Result

Scenario	Threat Zone	Reach	Effects	Affected Area
Flammable vapor Cloud	Red	38.405 m	8400 ppm =60% LEL= Flame Pockets, fire if ignition sources present	Filling shed 1
	Yellow	119.786 m	1400 ppm = 10% LEL, no fire potential	All filling shed area, tanker truck queue
Fire with thermal radiation	Red	24.689 m	10 kW/m^2 = may cause death in 60 seconds	Filling shed 1-4
	Orange	34.747 m	5 kW/m^2 = may cause 2 degree burn level in 60 seconds	Filling shed 5-6
	Yellow	53.035 m	2 kW/m^2 = may cause injuries in 60 seconds	Until filling shed 9
BLEVE	Red	311.81 m	10 kW/m^2 = may cause death in 60 seconds	Control room, filling shed, 13 storage tanks, buildings, society, traffic user
	Orange	440.741 m	5 kW/m^2 = may cause 2 degree burn level in 60 seconds	4 storage tanks, buildings, society, traffic user
	Yellow	686.714 m	2 kW/m^2 = may cause injuries in 60 seconds	5 storage tanks, buildings, society, traffic user
Explosion/VCE	Red	37.490 m	> 8.0 psi = may cause the damage of the car and surrounding building	Filling shed 1-6
	Orange	55.778 m	> 3.5 psi = may cause serious wound	Filling shed 6-7
	Yellow	128.016 m	> 1 psi = may cause the glasses shattered	Filling shed, 3 storage tanks, buildings

Quantitatively, the risks are calculated based on the individual and societal risks. Risk actions calculated from the quantitative risk assessment are: Potential Loss of Life (PLL); Individual Risk Per Annum (IRPA); and Societal Risk Criteria. The risk calculation are compared with the risk criteria from HSE UK[17]. The individual risk calculation result shows that all of the workers and tanker truck crews are in the acceptable level based on Table 3. The individual risks for society and traffic users are in the acceptable level as well. However, the society individual risk level is higher than that of the workers. It is supported by the estimation that the society members stay at home for 24 hours for the worst-case scenario. Therefore, continuous dissemination to workers and society members must be performed to make their safety, especially related to fire and explosion, as a priority.

Table 3. Potential Loss of Life. Individual Risk, and Societal Risk Calculation

No	Category	Amount (person)	IR for Immediate Fire	IR for Delayed Fire	IR for Explosion	IRPA	PLL (per year)
1	Office employees	72	4,160E-09	0,000E+00	0,000E+00	4,160E-09	2,995E-07
2	Shift employees	1071	5,719E-09	1,849E-12	1,269E-09	6,990E-09	7,487E-06
3	Societies	409	1,733E-08	0,000E+00	0,000E+00	1,733E-08	7,089E-06
4	Traffic users	292	6,595E-13	0,000E+00	0,000E+00	6,595E-13	1,926E-10
	Total	1844					1,487E-05

The cumulative risk has to be below the tolerable individual risk that has been approved (Societal Risk Criteria) showed in Figure 1. The cumulative risk which is over the Societal Risk Criteria can be categorized as unacceptable and must be reported. The mitigation plan must be initiated as well to reduce the risks in the tolerable area. However, it is important that the activities' risks between the tolerable and the avoidable must be reduced in accordance with the 'As Low As Reasonably Practicable' (ALARP) concept.

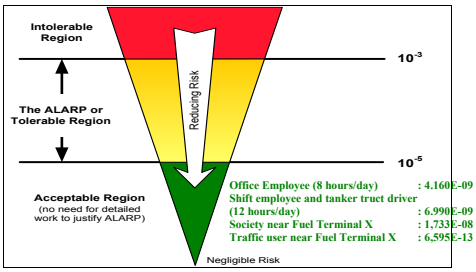

Figure 1. ***Individual Risk Criteria*** **Fuel Terminal X Jakarta**

Societal risk can be compared between every employees' group, namely the workers with office hour and the workers working under shift system. The societal risk for employees with 8 working hours a day is 2.995×10^{-7} per year, which is still considered acceptable. The societal risk for employees with 12 working hours a day is 7.487×10^{-6} per year, which is also considered acceptable. The fire and explosion training and dissemination program must be continuously well maintained.

Overall PLL with the frequency of 1.487×10^{-5} per year is within ALARP risk or tolerable area according to the worst-case scenario. Although it is within the ALARP category, even the smallest fire and explosion risks must be considered.

DISCUSSION

The tanker trucks have also been supplied with safety standard system and emergency response equipment for any accidents, such as in the cases of fire and explosion. In the filling process, there is a high risk of fuel leaking or overflowing during the filling process, especially at the filling sheds which have not implemented the automatic system. Besides the interlock system, the tankers must be equipped with a tank to contain the fuel overspill to reduce the risks.

According to the simulation system on the effects of tanker leakage, an emergency response system and an evacuation route in the area must be considered. The worst case that can happen is the failure of the detection and control systems. An advanced detection system must be installed at the filling shed area to reduce the effects. The main detector that must be installed is flame detector, so the flame source can be easily found and controlled.

The existing administrative control in the Fuel Terminal X is a limitation to the filling shed entry area. In addition, Fuel Terminal X also implements various procedures and actions in their emergency response, inspection, maintenance, and other activities. The company holds fire and explosion trainings in collaboration with third parties and disseminates information to the workers and tanker trucks crews.

The company documents show that there are some factors affecting the transportation safety, especially tanker truck crews' behavior. The tanker truck staff,

especially the driver, must be healthy both physically and psychologically and must have adequate understandings on occupational health and safety, fuel distribution and handling, the use of Protective Personal Equipment and tanker truck installation, and emergency response.

Implementing proper dissemination to surrounding community and the traffic users must also be considered. The surrounding community must know about the safe zones from fire and explosion incidents. The restriction beyond the safe zone must be considered as well to minimize any possible external threat. The company must improve the cooperation with the relevant organizations, such as the Fire Agency, the Police Department, the Ministry of Transportation, Jasa Marga, and the society members. This cooperation will ease the evacuation and mitigation process.

The findings of this study are expected to serve as an initial assessment and a consideration for the improvement of fire safety related to tanker trucks. Further study can be conducted to understand the fire and explosion risk levels in the distribution route. However, if the emergency conditions do present, the company is expected to give an adequate response and run a rehabilitation and reconstruction program after the incident.

CONCLUSION

The risk assessment results show that the individual risk for the company workers and the society around Fuel Terminal X Jakarta are in the Acceptable category according to Risk Acceptance Criteria HSE UK. The overall societal risks for the individual and the society are at the 'Tolerable' level or ALARP. Existing fire safety system involving fire and explosion preventions and controls that the company already implemented must be well maintained. Further risk assessment along distribution route must be implemented as well.

Conflict of Interest: None

Ethical Clearance: Completed

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REFERENCES

1. Center for Chemical Process Safety (CCPS). Guidelines for Chemical Transportation Safety, Security and Risk. New York: American Institute of Chemical Engineers and John Wiley & Sons, Inc. 2008.
2. Cuchi, Gasulla, Ventosa and Casal. Explosion of Road Tanker Containing Liquified Natural Gas. Journal of Loss Prevention in the Process Industries. 2004; 17: 315-321.
3. Eurostat. Transport in Figures, Statistical Pocket Book. European. Commission Directorate for Energy and Transport in co-operation with Eurostat. 2000.
4. Brenck, A. and Mondry S. Risiko Analyse des Gefahrguttranportes- Unfallstatistische Risiko Analyse auf der Basis Typischer Transportketten, Berich zum Forschungsprojekt 890611, BASt, Bergisch Gladbach. 1998.
5. German Federal Statictic Office (StBA). "Fachserie 8, Reibe 7 Verkehrsunfille Statistiches Bundesamt". Wiesbaden. 2000.
6. Ministry of Energy, Resources, and Mineral. Kajian Evaluasi dan Analisis Supply-Demand Energi Tahun 2012 (in Bahasa). Jakarta: Ministry of Energy, Resources, and Mineral Republic of Indonesia. 2012.
7. Less, F.P. Loss Prevention in The Process Industries: Hazard Identification, Assessment and Control. Oxford: Butterworth-Heinemann. 1996.
8. Kholiq, Nur. Bahan Bakar dan Pelumas. 2012. Available from: http://id.scribd.com/doc/84603075/Pengertian-Bahan-Bakar-Dan-Jenis.
9. Nolan, Dennis P. Handbook of Fire and Explosion Protection Engineering Principles for Oil, Gas, Chemical and Related Facilities. San Diego: Elsevier, Inc. 2014; 3rd edition.
10. Universitas Muhammadiyah Malang. Truk Bahan Bakar Meledak di Arab Saudi, Korban Jiwa Menjadi 22 Orang. 2012. Available from: http://www.umm.ac.id/id/internasional-umm-1335-truk-bahan-bakar-meledak-di-arab-saudi-korban-jiwa-menjadi-22-orang.html. (Accessed on 7 December 2014 at 17.05).
11. Langwinder, K. and Gwehenberger J. 2002. Tanker Trucks in The Current Accident Scene and Potentials

for Enhanched Safety. 7th International Symposium on Heavy Vehicle Weights & Dimensions. Delft. The Netherlands. 2002; 6.

12. Center for Chemical Process Safety (CCPS). Guidelines for Chemical Process Quantitative Risk Analysis. New Jersey: American Institute of Chemical Engineers and John Wiley & Sons, Inc. 2009.
13. OSHA. Material Safety Data Sheet for Hexane, Pentane and Heptane. 2007. Available from: https://www.osha.gov/
14. NIOSH. NIOSH Pocket Guide to Chemical Hazard. National Institute of Occupational Safety and Health. 2007.
15. The Committee for The Prevention of Disasters. Publication Series on Dangerous Substances (PGS 3): Guideline for Quantitative Risk Assessment 'Purple Book'. Netherlands: RVIM. 2005.
16. Indonesian Statistic. Kota Jakarta Utara Dalam Angka 2014 (in Bahasa). BPS Kota Jakarta Utara. DKI Jakarta. 2014.
17. Health and Safety Executive UK. Guidance on Risk Assessment for Offshore Installations. HSE UK Information Sheet. 2006.

Smile Card as a Breakthrough to Increase Dental and Oral Hygiene Level in Primary School Students in Jakarta

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ABSTRACT

School dental health services are implemented in an integrated manner through primary dental and oral health activities at the Public Health Center with the activities in the form of the School Dental Health Unit (*UKGS*) program. Various methods are used to achieve maximum dental and oral health, such as promotion and demonstration of toothbrushes for elementary school children. One way to improve children's behavior in maintaining dental and oral hygiene is by providing dental health education on how to brush teeth properly and correctly by using appropriate and appropriate aids or media. A Smile Card is one of the right methods to change children's behavior in maintaining dental and oral hygiene. This study aims to determine the effect of Smile Card on the oral and dental health of children. The sample were 150 people divided into groups of intervention and control. The results showed that there were differences in the influence of knowledge and the role of parents in improving dental and oral hygiene between the groups given the Smile Card intervention with the group not given the Smile Card, where $p = 0.001 < 0.05$. It can be concluded that the knowledge and role of parents influence the improvement of children's oral and dental hygiene.

Keywords: *Smile cards, Oral and dental hygiene, Elementary school students*

INTRODUCTION

School Dental Health Unit ***(UKGS)*** activities are part of the activities of the School Health Unit ***(UKS)*** which are routinely carried out in schools with the aim of fostering and realizing student independence for healthy living that enables the realization of optimal community health.

The presentation of the population who had dental and oral problems according to Basic Health Research ***(Riskesdas)*** in 2007 and 2013 increased from 23.2% to 25.9%. Among people who have dental and oral health problems, the percentage of the population who received dental medical care increased from 29.7% in 2007 to 31.1% in 2013. Similar to the Effective Medical Demand (EMD) which is defined as the percentage of the problematic population with teeth and mouth in the last 12 months multiplied by the percentage of residents who received dental care or treatment from dental medical personnel increased from 6.9% in 2007 to 8.1% in 2013. Most of the population aged ≥10 years (93.8 %) brush their teeth every day. Most residents also brush their teeth during an afternoon shower, which is 79.7%. Most residents brush their teeth every day during a morning shower or an afternoon bath. The true habit of brushing the Indonesian population is only 2.3%[(1)]. The proportion of people who brush their teeth every day after breakfast is only 12.6% and before going to bed at night only 28.7%. This may be due to a lack of knowledge and awareness of the teeth-mouth hygiene, as well as areas that are still difficult to reach information due to varying geographical conditions. Three provinces that had the highest percentage in brushing their teeth were DKI Jakarta Province (98.5%), West Java Province (95.8%), and East Kalimantan Province (95.5%), while the lowest was in NTT Province (74.7%) and Papua Province (58.4%)[(1)]. Factors of economic and income levels, as well as knowledge, show that low socioeconomic conditions have little awareness and knowledge of the importance of maintaining dental health compared to people who have a higher socioeconomic life. Other

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factors are attitudes and behavior towards dental health maintenance such as oral hygiene related to the frequency and habits of brushing teeth, the number and frequency of cariogenic foods that cause caries [2].

MATERIALS AND METHOD

This research was an attempt to create a new method by using a Smile Card to improve the degree of dental and oral hygiene in elementary school students in Jakarta. This research was conducted in Elementary School in Jakarta in 2016 with a total sample of 150 people. The first group was the intervention group that was given dental health education with a demonstration of brushing their teeth with a jaw model aids and accompanied by a Smile Card and the control group was given a tooth brushing education using a jaw model without Smile Card. The main sources needed in this study are 1) toothbrush, 2) students, 3) parents of students, and 4) Smile Cards.

The making of this new method was carried out in several steps: 1) promotion by demonstration and giving a Smile Card, 2) improving the family's ability in early prevention of cavities, 3) monitoring brushing teeth with the Smile Card, 4) testing methods through field research, 5) conclusion and submission of recommendations.

FINDINGS

The Role of Smile Card to Knowledge of Dental and Oral Care

The choice of method is based on the theory that dental health care by brushing teeth using a jaw model, as well as mentoring using a Smile Card has better results than without mentoring. Parental participation is very necessary for caring for, educating, encouraging and supervising. Mother plays an important role in maintaining the health of the child's teeth in underlying the formation of positive behaviors that support children's dental health. The attitude and behavior of parents in maintaining dental health has a significant influence on children's behavior[3]. Giving a Smile Card will help in monitoring the child's brushing habits by the teacher and parents. Children's oral and dental health depends on children's adherence and mentoring parents in caring for them[4]. With the willingness of parents to start treatment on the child's teeth, a better child's oral and dental health will be obtained[5]. For more details, see Table 1.

Table 1. Distribution of knowledge of respondents given smile cards with control group respondents against dental and oral health elementary school children in Jakarta

Variable	Mean	SD	p-value	n
Knowledge				
Treatment	14.2800	1.0042	0.001	75
Control	13.4733	1.6777		75

The Table 1 shows that there was a significant difference of knowledge between the respondents given the Smile Card intervention with the respondents who are not given the Smile Card (control), namely p = 0.001. The mean score of knowledge of the respondents given the smiling card 14.2800 + 1.0042 and control group 13.4733 + 1.6777. Thus granting a Smile Card can increase elementary students' knowledge about dental and oral health.

Effect of Smile Cards on the Role of Parents in the Dental and Oral Care

With the health promotion intervention program by demonstrating and giving a Smile Card, as well as improving the ability of families to make early prevention of cavities with the habit of brushing their teeth regularly, will improve the ability of the community, especially elementary school students and can be observed the habit of brushing their teeth. Health promotion intervention program with the resulting Smile Card can be used as dental and oral health services in order to carry out various promotive and preventive activities in dental and oral health. This intervention will be strongly related to family empowerment as the smallest group in society, as an effort to improve the quality of dental and oral health in various dental and oral health services, both in rural and urban areas. Therefore, knowledge, especially of the mother's knowledge of dental and oral hygiene, greatly determines the cleanliness of the child's teeth and mouth[6],[7]. For more details can be seen in Table 2.

Table 2. Distribution of parent roles in children given a smile card withcontrol group on dental and oral health of primary school children in Jakarta

Variable	Mean	SD	p-value	n
The role of parents				
Treatment	6.63	0.700	0.001	75
Control	5.84	0.883		75

The results of the analysis showed that there were significant differences in the role of parents between students who were given a Smile Card intervention and those who were not given a Smile Card (control), namely p = 0.001. The mean score of role of parents was given Smile Card 6.63 + 0.700 and control group 5.84 + 0.883. Thus giving Smile Card can improve the role of parents in maintaining oral hygiene.

Recommendations

From the results of the analysis, it was concluded that the Smile Card accompanied by a demonstration of brushing teeth proven to improve the dental and oral hygiene of elementary school students in Jakarta. The most powerful influence in improving oral hygiene is the sole factor of parents and is shown to interact strongly with knowledge in efforts to improve dental hygiene of primary school students in Jakarta. It is recommended that educators or extension workers, both dental health workers and dental health cadres, conduct dental and oral health promotions and demonstrations to be accompanied by a Smile Card so that optimal goals can be obtained for improving the level of dental and oral hygiene of elementary school children.

DISCUSSION

This study presents the use of smile cards as a method to improve the dental and oral health of elementary school students. Child and parent knowledge about dental and oral health is very important in shaping behaviors that support oral and dental hygiene of parents' children with low knowledge of dental and oral health are predisposing factors for behavior that does not support children's oral and dental health[4],[8]. This can happen because parents are the main social force that influences children's development, including dental and oral health care for children[3],[9],[10]. Knowledge is influenced by education, especially promotion and demonstration of dental and oral hygiene care. Health education is the simplest and most cost-effective approach[11],[12]. Extension education in the form of promotions and demonstrations equipped with a smile card will make it easier for children and parents, especially mothers, to adhere to children's oral and dental health care. Health education increases awareness of the importance of dental and oral health[6]. Therefore the existence of a smile card will help children and mothers to care for the health of their teeth and mouth. The attention of parents, especially mothers, to the health of the teeth and mouth of children begins early so that a habit is obtained to obtain general health.

Likewise, the role of parents has an influence on the cleanliness of the teeth and mouth of children. Family, that is, the attitude of parents to the importance of oral hygiene, plays a major role in the preservation of healthy children's teeth. The family creates the environment necessary for a healthy lifestyle, increases self-confidence, and helps shape habits[7]. This can occur because the behavior and health practices of parents generally have an influence on the dental health of children[5]. The role of parents has a big influence because children also learn from what they see, hear, and from experience about an event. Children learn through their observations of an activity carried out by their mother-father or teacher. Children learn from what they hear from parents and people around them and their environment. Children will imitate mother-father activities so that they gain experience about an event[13]. The more active the role of parents towards their children, the better the behavior of children. In this case, parents not only play a role but also act. Dental health status is influenced by health behavioral factors which include factors of knowledge, attitude, and action (practice). Therefore, the role of parents is very important in guiding, understanding, reminding and setting an example so that children are able to develop their personal growth, parental responsibilities, and loving care and provide facilities for children so that children can maintain the health of their teeth and

mouth. Parents, especially the mother, are the closest figure to the child since the child was born, besides that the child's behavior also plays a role in maintaining the health of his teeth and mouth[14].

CONCLUSION

This study has recommended the Smile Card method as a breakthrough in improving dental and oral hygiene in elementary school students. This method can be used in promotions accompanied by tooth brushing demonstrations to improve the degree of dental and oral hygiene of elementary school students. The results of the study prove that the knowledge and role of parents have an influence on improving children's oral hygiene.

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REFERENCES

1. Kemenkes RI. Basic Health Research 2007 (Riset Kesehatan Dasar 2007). Jakarta: Badan Penelitian dan Pengembangan Kesehatan, Departemen Kesehatan Republik Indonesia; 2007. 1–290 p.
2. Jovina TA. Effect of Tooth Brushing Habits on the Status of Caries Experience (Pengaruh Kebiasaan Menyikat Gigi Terhadap Status Pengalaman Karies). Riskesdas 2007:96.
3. Mentari S, Bany ZU, Novita CF. Relationship between the Role of Parents and the DMF-T Index of Primary School Students with UKGS (Study in SDN 20, Kuta Alam District, Banda Aceh City) (Hubungan Peran Orang Tua Terhadap Indeks DMF-T Siswa Sekolah Dasar Dengan UKGS (Studi Pada SDN 20 Kecamatan Kuta Alam Kota Banda Aceh)). Journal Caninus Dentistry. 2016;1(4):63–9.
4. Al-Omiri MK, Board J, Al-Wahabi AM, Saeed KN. Oral Health Attitudes, Knowledge, and Behavior Among School Children in North Jordan. Pubmed, Journal of Dental Education. 2006;70(2):179–87.
5. Almoudi MM, Hussein AS, Doss JG, Schroth RJ. Expectant Mothers' Readiness to Initiate Preventive Oral Health Care for Their Children. The Saudi Journal for Dental Research. 2016;7(2):118–26.
6. Djordjevic A. Parents´Knowledge about the Effects of Oral Hygiene, Proper Nutrition and Fluoride Prophylaxis on Oral Health in Early Childhood. Balkan Journal of Dental Medicine. 2018;1;22(1):26–31.
7. Saldūnaitė K, Bendoraitienė EA, Slabšinskienė E, Vasiliauskienė I, Andruškevičienė V, Zūbienė J. The Role of Parental Education and Socioeconomic Status in Dental Caries Prevention among Lithuanian Children. Medicine. 2014;50(3):156–61.
8. Sariningrum E. The Relationship between the Level of Education, Attitudes and Parental Knowledge about Dental and Oral Hygiene in Toddlers 3-5 Years of Age with Caries Incidence in Jatipurno PAUD (Hubungan Tingkat Pendidikan, Sikap dan Pengetahuan Orang Tua tentang Kebersihan Gigi dan Mulut pada Anak Balita 3-5 Tahun dengan Tingkat Kejadian Karies di PAUD Jatipurno). 2009;2-7.
9. Bozorgmehr E, Hajizamani A, Malek Mohammadi T. Oral Health Behavior of Parents as a Predictor of Oral Health Status of Their Children. ISRN Dentistry. 2013;2013:1–5.
10. Chand S, Chand S, Dhanker K, Chaudhary A. Impact of Mothers′ Oral Hygiene Knowledge and Practice on Oral Hygiene Status of Their 12-Year-Old Children: A Cross-Sectional Study. Journal of Indian Association of Public Health Dentistry. 2014;12(4):323.
11. Garbin CAS, Soares GB, Dócusse FRM, Garbin AJÍ, Arcieri RM. Oral Health Education in School: Parents' Attitudes and Prevalence of Caries in Children. Revista de Odontologia da UNESP. 2015;44(5):285–91.
12. Diana SD, Domnariu CD. Evaluation of Parental Knowledge About Oral Health of A Preschool Children Population. 2017;3.
13. Notoatmodjo S. Health Promotion and Health Behavior (Promosi Kesehatan dan Perilaku Kesehatan). Jakarta: Rineka Cipta; 2012.
14. Husna A. The Role of Parents and the Behavior of Children in Teeth Brushing on Child Caries Incidence (Peran Orang Tua dan Perilaku Anak dalam Menyikat Gigi dengan Kejadian Karies Anak). 2016.

Analysis of Determinan Factors of Exclusive Breastfeeding In Indonesia: A Case of Ulakan Tapakis District

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ABSTRACT

Background and Aim: Infant's nutritional needs for optimal growth and development up to of 6 months can be supplied by exclusive breastfeeding because it contains all the nutrients as the infant needs. However, the exclusive breastfeeding practice has been relatively low in Indonesia, including Tapakis District in West Sumatera Province. The study aimed to explore the determinant factors related to this practice.

Method: A cross sectional study was conducted in Uakan Tapakis District, on 88 mothers who have a child aged 0-12 months. To understand the determinant factors, the data was analyzed both using bivariate and multivariate analysis.

Result: The result shows that exclusive breastfeeding is associated to knowledge (p=0.025), attitude (p=0.038), motivation (p=0.044), occupational status (p=0,025), health resource availability (p=0,028), health officer role (p = 0,013) and family support (p= 0,038). Moreover, the most dominant variable is the role of health workers in supporting the breastfeeding practice (p= 0.013, OR=8.772).

Conclusion: The health workers, especially midwife plays significant role in supporting breastfeeding practice. It is necessary to have good communication and health education from health workers for the succeed implementation.

Keywords: *Exclusive breastfeeding, determinants, health workers*

BACKGROUNDS

The standard of health in a country can be seen from Infant Mortality Rate (IMR) and the life expectancy of its population.[1] Globally, the World Health Organization (WHO) states that the number of infant deaths is about 1 million stillbirths and 2.7 million deaths in the first week of life. More than 63 countries in the world, including in the Asian region, are in dire need of efforts to reduce the infant mortality in order to achieve the Suitable Development Goals (SDGs) target, namely 12 deaths per 1,000 live births in 2030.[2]

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In Indonesia especially, the IMR is also relatively higher than neighboring countries. The data of Indonesian Demographic and Health Survey (IDHS) has shown that the IMR dropped from 68 to 32 deaths per 1,000 live births in 1991 and 2012 respectively.[3] In West Sumatra Province especially, the cases of infant mortality was found 392 cases in 2014.[4]

WHO and the United Nations Children's Fund (UNICEF) lead global breastfeeding advocacy initiatives to ensure that exclusive breastfeeding rates increase by at least 50% by 2025.[5] WHO and UNICEF in Infant and Young Child Feeding, recommend the gold standard for feeding infants and children are (1) early breastfeeding initiation at 1 hour of birth, (2) Exclusive breastfeeding in the first 6 months, and (3) introduction to complementary solid food with adequate and safe nutrition at 6 months together with continuing breastfeeding for up to 2 years or more.[6] World Breastfeeding Week Guide in

2016 states that exclusive breastfeeding has a large contribution to growth and endurance. Children who are given exclusive breastfeeding will have optimal growth and development and are not easily get ill. This is in accordance with several global studies and facts.[7]

The coverage of exclusive breastfeeding in West Sumatra Province was relatively low, and did not reach the target, such as 60.0% in 2011 from the target of 67.0%, and 75.1% in 2015 from the target of 83.0%.[8] The exclusive breastfeeding practice in Padang Pariaman Regency was even lower, which was only 56% and 57.4% in 2014 and 2015 respectively. Among all districts in Padang Pariaman, Ulakan Tapakis Districts was the lowest with exclusive breastfeeding rate 29.8% in 2015.[9] Therefore, the study aimed to explore the determinant factors related to exclusive breastfeeding in this district as a case study, that can be inferable data for Indonesia.

METHOD

A cross sectional study was conducted in Ulakan Tapakis District, with the data collection between June and November 2017. The participants of the study was 88 mothers who had a baby 06-12 months, which selected randomly.

The instrument was developed by using Ministry of Health of Indonesia guidelines on breastfeeding practice. Later the data analyzed quantitatively both using bivariate and multivariate analyses.

RESULT

The result shows that there are 21.6% participants who do an exclusive breastfeeding. The distribution of knowledge, attitude, education and other variables are comparable between high and low (as can be seen in table 1).

Tabel 1. Distribution The Implementation of Exclusive Breastfeeding and Related Factors

Variable	f (n = 88)	%
Implementation of Exclusive Breastfeeding		
Exclusive	19	21,6
Not Exclusive	69	78,4
Knowledge		
Low Knowledge	50	56,8
High Knowledge	38	43,2
Attitude		
Negative Attitude	44	50,0
Positive Attitude	44	50,0
Motivation		
Not Good	48	54,5
Good	40	45,5
Education		
Low	49	55,7
High	39	44,3
Occupation		
Unemployed	66	75,0
Employed	22	25,0
Availability of Health Resources		
Not Available	58	65,9
Available	30	34,1
Affordability of Health Resources		
Unreachable	47	53,4
Affordable	41	46,6
Health Worker Skills		
Unskilled	47	53,4
Skilled	41	46,6
The Role of Health Workers		
Do Not Play a Role	33	37,5
Play a Role	55	62,5
The Role of Non-Health Workers		
Do Not Play a Role	71	80,7
Play a Role	17	19,3
Family Role		
Do Not Play a Role	44	50,0
Play a Role	44	50,0
Myth		
Believes	51	58,0
Do Not Believe	37	42,0
Formula Milk Promotion		
Interested	35	39,8
Not Interested	53	60,2
Health Problem		
No Health Problem	83	94,3
There are Health Problem	5	5,7

The exclusive breastfeeding practice associated to knowledge (p=0.025), attitude (p=0.038), motivation (p=0.044), occupational status (p=0.025), health resource availability (p=0.028), health officer role (p = 0,013), and family support (p=0.038) (see table 2).

Tabel 2. Variables relations with the implementation of exclusive breastfeeding

Variable		Implementation of Exclusive Breastfeeding				*p*
		Exclusive (n = 19)	%	Not Exclusive (n = 69)	%	
Knowledge	High	13	34,2	25	65,8	0,025
	Low	6	12,0	44	88,0	
Attitude	Positive	14	31,8	30	68,2	0,038
	Negative	5	11,4	39	88,6	
Motivation	Good	13	32,5	27	67,5	0,044
	Not Good	6	12,5	42	87,5	
Education	High	11	28,2	28	71,8	0,278
	Low	8	16,3	41	83,7	
Occupational Status	Unemployed	10	15,2	56	84,8	0,025
	Employed	9	40,9	13	59,1	
Availability of Health Resources	Available	11	36,7	19	63,3	0,028
	Not Available	8	13,8	50	86,2	
Affordability of Health Resources	Affordable	8	19,5	33	76,6	0,855
	Not Affordable	11	23,4	36	80,5	
Health Worker Skills	Unskilled	9	22,0	32	78,7	1,000
	Skilled	10	21,3	37	78	
The Role of Health Workers	Play a Role	17	30,9	38	69,1	0,013
	Do Not Play a Role	2	6,1	31	93,9	
The Role of Non-Health Workers	Play a Role	3	17,6	14	82,4	1,000
	Do Not Play a Role	16	22,5	55	77,5	
Family Support	Play a Role	14	31,8	30	68,2	0,038
	Do Not Play a Role	5	11,4	39	88,6	
Myth	Do Not Believe	6	16,2	31	83,8	0,435
	Believes	13	25,5	38	74,5	
Formula Milk Promotion	Not Interested	9	17,0	44	84,0	0,304
	Interested	10	28,6	25	71,4	
Health Problem	No Health Problem	18	21,7	65	78,3	1,000
	There are Health Problem	1	20,0	4	80,0	

Table 3 Dominant Factor The Implementation of Exclusive Breastfeeding

	Variable	p value	OR	95 % CI
Last Step	Motivation	0,004	8,560	1,978 – 37,054
	Availability of health resources	0,998	1,778	0,000
	Affordability of health resources	0,998	0,000	0,000
	The role of health workers	0,013	8,772	1,584 – 48,596

Multivariate analysis shows that the most dominant variable is the role of the health worker, with p value 0.013 and OR of 8.772 (CI=1.584 – 48,596).

DISCUSSIONS

Based on the results of the study, it is found that only a small proportion (21.6%) of respondents who carrie out exclusive breastfeeding on their babies. This result is very far from the achievement target of exclusive breastfeeding which is supposed to be 83.0%. According to research conducted by Rhokliana[10] mother, family, and community have little understanding about exclusive breastfeeding. Not a few mothers who still throw colostrum away because it is considered dirty. In addition, the habit of giving food and drinks early to baby in community also cause unsuccessful exclusive breastfeeding. Some mothers also lack of confidence to be able to breastfeed their babies. This encourages mothers to easily stop breastfeeding and replace it with formula milk.

The study it reveals that the knowledge of mother is associated to the implementation of exclusive breastfeeding. Another research conducted by Kusumaningrum[11] states that the poor knowledge is thought to be due to lack of information, lack of clarity of information, and lack of ability to understand the information received. The research conducted by Kusumaningtyas[12] states that poor knowledge in Exclusive breastfeeding can be caused by other factors that influence knowledge, including non-supporting environmental factors that can prevent a person from having poor knowledge.

The study also shows that there is a significant relationship between the attitudes of respondents and the implementation of exclusive breastfeeding. This is in accordance with Haryati's[13] opinion, that a mother who has never received advice or experience, breastfeeding counseling and the ins and outs of others, as well as from reading books, the mother will have less knowledge and influencing her attitude so that it becomes negative towards exclusive breastfeeding.

The motivation is also significantly associated to the implementation of exclusive breastfeeding. Sopiyani's study[14] in Klaten District found a very significant positive relationship between social support and motivation to provide exclusive breastfeeding. That is, the higher (stronger) the social support, the higher the motivation for giving exclusive breastfeeding.

Leve of education is also associated to implementation of exclusive breastfeeding significantly. The results of this study are not in line with Atabik[15] in his research, which states that there is a significant relationship between the level of maternal education and the implementation of exclusive breastfeeding in the Pamotan village of Rembang Regency. Mothers who have higher education generally also have better nutrition knowledge and have greater attention to the nutritional needs of children.

Meanwhile occupational status is also associated to exclusive breastfeeding practice. Its means that good environment very much influence the mother in their feeding baby practice. As Satino's research[16] in Surakarta City, explained that environmental factors support exclusive breastfeeding and the environment did not support exclusive breastfeeding.

The study also shows that the availability and access to health resources very much associated to the implementation of exclusive breastfeeding. Likely due to lack of information about exclusive breastfeeding from childbirth helper in the place of the mother giving birth. It can be expected that the combination of these two components is the key to the success of the lactation process.[17] In order to be able to achieve a wider community health service, a Health Center (Puskesmas) was established *Posyandu* (Integrated service post). Particularly in the field of midwifery with the aim

of accelerating the reduction of maternal and infant mortality, the idea of a midwife in the village.[18]

The role and support of health workers is significantly associated to implementation of exclusive breastfeeding. The results of this study are in line with Tesy Mamonto's research[19] in the work area of Kotobangon Public Health Center, West Kotamobagu Subdistrict, Kotamobagu City, where the results of the study stated that there was a relationship between the role of health workers and exclusive breastfeeding, where most respondents did not exclusively breastfeed because of the lack of role/ support from health workers. Based on the results of research conducted by Josefa[20] in the District of West Semarang, it turns out that the support of health workers in the period before and after childbirth, such as education and counseling, has not been as expected.

Moreover, the family support, including husband and relatives who stay at the same house with participants is very much influenced them to have exclusive breastfeeding practice. Research conducted by Hedianti[21] states that family members who play the most role in providing support in terms of informational support and assessment support are husbands, while family members who play the most role in instrumental support and emotional support are husbands and parents. From all of aspects of support, the family members who have the most role in providing support are husband and parents (67.9%).

About myth and false beliefs variables about baby food, based on the results of the study concluded that there was a significant relationship between the myths with the implementation of exclusive breastfeeding. One of the obstacles for breastfeeding mothers is their belief in myth. In fact, the myth cannot be proven true.[22] Myth is the fruit of ancient thought where analysis of a certain condition is still very limited. In line with the term 'not all myths are wrong', then not all myths can be held true.[23] Formula milk promotion variable, based on the results of the study concluded that there was no relationship between the promotion of formula milk with the implementation of exclusive breastfeeding. This study is in line with the research conducted by Isnaini[24], in which the mothers with poor education is at risk giving formula milk. Maternal education, in addition as the main asset in the household economy, also plays a role in the initial feeding of the baby.

Multivariate analysis result shows that the most dominant variable related to the implementation of exclusive breastfeeding is the role of health workers. In contrast to the research conducted by Tesy Mamonto[19] in the work area of Kotobangun Health Center, Kotamobagu Timur District, Kotamobagu City, stated that the most dominant variable is respondent attitude towards exclusive breastfeeding. And research conducted by Astuti[25] in the work area Serpong Health Center, said that the most dominant variable is the parent role related to the behavior of giving exclusive breastfeeding.

CONCLUSIONS

Based on the results of the research and discussion that refers to the research objectives, it can be concluded that the factors related to the implementation of exclusive breastfeeding are including predisposing factors (knowledge, attitudes, motivation, and work), enabling factors (the availability of health resources), and reinforcing factors (the role of health workers and the role of the family). The most dominant variable is the role of health workers, which implies that good communication and health education from health workers is necessary for the succeed implementation of exclusive breastfeeding practice.

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REFERENCES

1. Ministry of Health of Indonesia. Indonesian Health Profile 2015. Jakarta: Ministry of Health of Indonesia, 2016.
2. UNICEF (United Nations Children's Fund). Levels & Trends in Child Mortality. New York: UNICEF, 2015
3. Central Board of Statistics of Indonesia. Indonesian Welfare Indicators. Jakarta: Central Board of Statistics of Indonesia 2015.
4. Department of Health of West Sumatera Province. Health Profile of West Sumatera Province. Padang:

Department of Health of West Sumatera Province, 2016.

5. WHO (WorldHealth Organization). Viet Nam Breastfeeding Campaign Normalizes Practice, Improves Rate, diakses 21 Januari 2017, <http://www.who.int/features/2016/Viet-Nam-breastfeeding-campaign/en/>. 2016.
6. WHO (World Health Organization). Infant and Young Child Feeding. diakses 21 Januari 2017, <http://www.who.int/mediacentre/factsheets/fs342/en/>. 2016.
7. Ministry of Health of Indonesia. Guidelines for Training Counselling for Infant and Child Feeding. Jakarta: Ministry of Health of Indonesia, 2014.
8. Department of Health of West Sumatera Province. Health Profile of West Sumatera Province in 2014. Padang: Department of Health of West Sumatera Province, 2015.
9. Department of Health of Padang Pariaman Regency. Health Profile of Padang Pariaman Regency 2014. Department of Health of Padang Pariaman, 2015.
10. Rhokliana A, Chandradewi S. Relationship of social-culture and breastfeeding practice in Keruak, Regency of Lombok Timur. Journal of Health Excellence 2011;5(2):765-777.
11. Kusumaningringrum T. Maternal factors in un-exclusive breastfeeding in Cepokosawit Village, Regency of Boyolali [thesis]. Faculty of Health of Muhammadiyah University Yogyakarta, 2016.
12. Kusumaningtyas DW, Caturningsih RK. Relationship of knowledge on exclusive breasfeeding on working mother in Mardi Rahayu Hospital. Journal of Midwifery and Health 2013:56-67.
13. Haryati S. Determinant factors associated to exclusive breastfeeding up to four months in Kandangmas Village, Kudus Regency of Semarang [thesis], Faculty of Public Health, Diponegoro University, 2006.
14. Sopiyani L. Relationship of social support and motivation in exclusive breastfeeding practice in Klaten Regency [thesis]. Faculty of Psychology, University of Muhammadiyah Surakarta, 2014.
15. Atabik A. Maternal factors related to exclusive breastfeeding [thesis]. Department of Public Health, Semarang State University.
16. Satino SY. Analysis of determinant factors of exclusive breastfeeding in primipara mother in Surakarta City. Journal of Comprehensive of Health Sciences 2014;3(2):106-214.
17. Soetjiningsih. Breastfeeding: Guidelines for Health Workers. Jakarta: EGC. 2012.
18. Manuaba CAI. Understanding of Health Reproduction, 2nd edition. Jakarta: EGC. 2009.
19. Mamonto T. Determinant factors related to exclusive breastfeeding for infant in Kotobangon District Kecamatan Kotamobagu Timur Kota Kotamobagu, Journal of Public Health of Sam Ratulangi 2014:56-66.
20. Josefa KG. Determinant factors influence exclusive breastfeeding in Manyaran Health Center, Semarang Barat District [thesis], Faculty of Medicine of Diponegoro University, 2011.
21. Hedianti DA. Family Support and Exclusive Breastfeeding in Pucang Sewu Health Center, Surabaya City [thesis]. Faculty of Medicine of Airlangga University, 2016.
22. Khasanah N. Breast Milk or Formula. Jogjakarta: FlashBooks. 2011.
23. Wiji RN. Breastfeeding and Guideline for Mother. Yogyakarta: Nuha Medika. 2013.
24. Isnaini N. Apriyanti R. Determinant factors related to providing formula milk for infants 0-6 months in Agnes Way Kandis Clinic, Bandar lampung City. Journal of Midwifery 2013;1(1):1-4.
25. Astuti I. Determinant factors of exclusive breastfeeding. Journal of Health Quality 2010;4(1):1-7.

Effect of Strategic Foresight on the Success of Healthcare Marketing

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ABSTRACT

After a decade of war, Iraqi government embarks in the strengthening of private firms after years of sanctions. The government of Iraq for the preceding period after the international war and a series of several sanctions that negatively affected medical system focused on the development of the old medical system. Studies show that strategic foresight contributes to the success of organizations. Hence, this study aims to identify the impact of strategic foresight on the success of healthcare marketing in Iraq. A total of 171 respondents collected from private hospitals and clinics. The results revealed that strategic foresight with customer, market, competitive and technology foresight has a positive impact on healthcare marketing.

Keywords*: Iraq Healthcare, Customer Foresight, Market Foresight, Competitive Foresight, Technology Foresight.*

INTRODUCTION

Iraqi economy and general healthcare system are emerging from a long term conflict that dwelled for many decades. The government has the role of providing medical services to its citizens through government-owned hospitals or facilitation of the private hospitals and healthcare firms[1] . The marketing of the private medical firms in Iraq was put on course after the subsidence of the 2003 US invasion[2]. The medical system of Iraq is run by the Iraqi government, but the more substantial portion is left to the private sector[3] . The growth of the private health sector in Iraq depends on the invitation of the private investors who will facilitate the growth and development of the customer-driven medical system[4] .

Many authors and researchers have written articles and journals regarding Iraqi future medical system. The researchers have focused on the independent topics of patient's foresight, market prediction and competition[5]. Others have significantly focused on the needs of the technology and the roles it plays in impacting needs of the Iraqi medical market amid the rising number of private hospitals[6] . Private hospitals market themselves with three different purposes. First, they want to understand their patients well. The hospital search to have a deeper insight into their customers and buyers[7]. Marketing helps in identifying the needs of customers and finding a suitable fit for the need. Marketing ought to communicate in a clear way that provides enough information and customers decide to make purchases by been convinced that the product will fulfill their needs. There is a need to improve the marketing of private hospitals in Iraq. The reason has been that most of them have been ineffective for various reasons [8] . This includes lack of cohesion between business strategy and the marketing strategy employed, and failure to establish a marketing strategy that is unique[9] . The purpose of this study is to show how a private hospital can use strategic foresight to improve its marketing[10].The private hospitals market their services with an aim of increasing their revenues. These hospitals have not done all there is to do in there marketing [11] .Thus, there is a need to improve the current marketing models by applying appropriate strategic tools.

LITERATURE REVIEW

Strategic Foresight

According to (Rohrbeck et al., 2013)[12], they voiced

out that strategic foresight originates from the two words strategy and foresight. Foresight is the ability of an institution or a firm to judge and predict correctly what is going to happen in the future and so as to plan its actions based on this knowledge[13]. In studies, termed strategic foresight as a strategy tool that gives a clear picture of the true nature of something of product. He went ahead and explained that strategic insight entailed the act of carrying out product testing sessions to clearly evaluate and get a clear insight of a type of product. According to(David,2012)[14] Strategic foresight includes four dimensions (Customer (CUF),Market (MAF),Competitive (COF),Technology (TEF)) as it shown in figure 1.

Figure 1. Strategic Foresight Dimensions

The aspect of customer foresight can be observed from a different perspective, but for marketing purposes, private medical firms are driven by a single agenda of profitability. A private hospital in Iraq partners with international pharmaceutical firms in the provision of medical services[15]. Market foresight is one of the key factors in the formulation of the organization's strategy. It varies with the nature of the organization and its needs when it comes to strategy but the essence of any strategy must be about building the future. Thus, strategic planning should always include consideration of potential and potential scenarios in the relevant business environment; hence the market foresight must be systematic and planned[16]. Technology is a significant component of the medical facility. As an independent variable, technology influences the growth of medical and healthcare growth. For instance, communication plays a significant role in connecting people and medical facilities. The awareness's need for private hospitals to reach people depends on the level of technology. Competitive foresight is an important tool for developing the strategic vision required by analyzing competitors and developing future solutions that can represent a future competitive advantage that contributes to improving the competitive position of the organization[17].

Healthcare Marketing

Some scholar has an opinion that the marketing strategy model is not adequate to market both goods and services [18]. Goods and services have different characteristics like goods are tangible whereas services are intangible [19] . According to Hill & Alexander (2017)[20], strategic priorities are concerned with long-term goals and highly rank customers satisfaction. Organizations have their vital focus on the customer and provide the goods and services which will satisfy their needs so as to create customer loyalty [21]. To achieve this. The marketing manager is at the pivot to ensure a proper marketing is conducted to convince customers that the product will satisfy their needs.

Private hospitals market themselves with three different purposes. First, they want to understand their patients well. The hospital search to have a deeper insight into their customers and buyers[7]. Marketing helps in identifying the needs of customers and finding a suitable fit for the need.

MATERIAL AND METHOD

Instrument

The instrument of this study was the survey it was used and conducted in private hospitals and clinics, the population for this study comprises of the physicians, random sample has been selected among them, the sample size is 171 . The first section deals with demographic sample. the second section deals with strategic foresight and its dimensions (CUF ,MAF,COF,TEF) , depending on the scale was developed and standardized by (David,2012)[14], the third section deals with healthcare marketing , depending on the scale was developed and standardized by (Kumar et al.,2014)[22]. Cronbach's Alpa coefficient was used to determine the internal consistency and it is refer to a good value of all the items and the value of Cronbach's Alpa was 0.952 in general which insures the reliability of the instrument.

Normality

The normality test used to deciding use parametric or non-parametric tests, for this purpose Kolmogorov-Smirnov test is used for normality test, and when data is normal distribution, non-parametric statistical tests can be used to analyze and verse versa if distribution is not normal, parametric tests can be used . Results in Table 1 refer to that the data are normally distributed.

Table 1: Normality Test

Variable	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
SF	0.096	171	0.060	0.935	171	0.064
HM	0.115	171	0.063	0.936	171	0.057

Factor Analysis

The questionnaire items of SF for each of dimensions were factor analyzed to establish the dimensions of the responses, as it shown from Table 3 the confirmatory factor analysis exceed 0.5 and refer to that the items relating to each of SF factors loaded onto the anticipated factors as it shown in Table 2.

Table 2: Factor Loadings

Item	Path	Factor	Loading	Item	Path	Factor	Loading
CUF 1	<---	CUF	0.647	COF 11	<---	COF	0.786
CUF 2	<---	CUF	0.741	COF 12	<---	COF	0.835
CUF 3	<---	CUF	0.726	COF 13	<---	COF	0.635
CUF 4	<---	CUF	0.766	COF 14	<---	COF	0.758
CUF 5	<---	CUF	0.676	COF 15	<---	COF	0.575
MAF 6	<---	MAF	0.703	TEF 16	<---	TEF	0.654
MAF 7	<---	MAF	0.630	TEF 17	<---	TEF	0.621
MAF 8	<---	MAF	0.778	TEF 18	<---	TEF	0.705
MAF 9	<---	MAF	0.716	TEF 19	<---	TEF	0.725
MAF 10	<---	MAF	0.621	TEF 20	<---	TEF	0.697

Conceptual Framework

The Conceptual framework developed shall further conceptualize the impact of SF dimensions on HM, and it developed according to the literatures and scales, as it is presented in Figure 2.

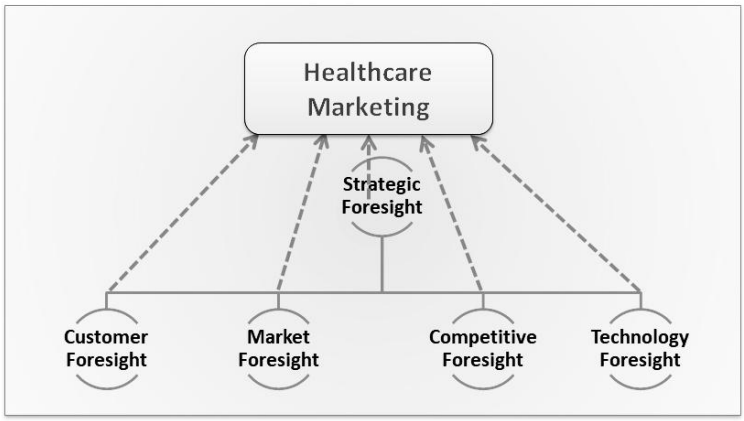

Figure 2: Conceptual Framework

FINDINGS

The results of Table 3 show that there is a positive significant relationship between SF and HM (r=0.795 ,t=17.050 ,P<0.05) . This result is consistent with (David,2012)[14] study where SF has been considered as a success factor to improve the performance. Regarding the dimensions the results show that there is a positive significant relationship between CUF and HM (r=0.620 ,t=10.272 ,P<0.05) . This result is consistent with (Rohrbeck et al., 2013)[12] study where CUF has been considered as critical success factor of HM .Moreover , the obtained results point out that there is significant association between MAF and HM (r=0.732 ,t=13.970 ,P<0.05), and this result is compatible with (David,2012)[14] recommendation where it stressed that MAF has a high effect on HM .Regarding COF the results show that there is a positive significant relationship between COF and HM (r=0.691 ,t=12.416 ,P<0.05) . This result is consistent with (Rohrbeck et al., 2013)[12] study where COF has been considered as critical success factor of HM .Moreover, the obtained results point out that there is significant association between TEF and HM (r=0.685 ,t=12.217 ,P<0.05), and this result is compatible with (David,2012)[14] recommendation where it stressed that TEF has a high effect on HM .

Table 3: Correlation Coefficient Results

IV	r	T	sig	DV
SF	0.795	17.050	P<0.05	HM
CUF	0.620	10.272	P<0.05	
MAF	0.732	13.970	P<0.05	
COF	0.691	12.416	P<0.05	
TEF	0.685	12.217	P<0.05	

Table 4 results show that SF has a positive impact on HM, SF explains 63.2% of the variance and predict 0.805 increase in HM , the significant level is <0.05 and (F=290.686), and the regression equation is (HM=0.874+0.805 SF) therefore the results support the hypothesis 1. Regarding the dimensions the results show that there is a positive impact of CUF on HM, CUF explains 38.4% of the variance in HM and predict 0.591 increase in HM , the significant level is <0.05 and (F=105.509) , and the regression equation is (HM=1.738+0.591 CUF) therefore the result support the hypothesis 2 there is statistically significant impact of CUF on HM. Moreover , the obtained results point out that there is a positive impact of MAF on HM, MAF explains 53.6% of the variance in HM and predict 0.609 increase in HM , the significant level is <0.05 and (F=195.166) , and the regression equation is (HM=1.765+0.609 MAF) therefore the result support the hypothesis 3 : there is statistically significant impact of MAF on HM. Also results refer to positive impact of COF on HM, COF explains 47.7% of the variance in HM and predict 0.583 increase in HM , the significant level is <0.05 and (F=154.155) , and the regression equation is (HM=1.826+0.583 COF), therefore the result support the hypothesis 4 : there is statistically significant impact of COF on HM . Finally, the results show that there is a positive impact of TEF on HM, TEF explains 49.9% of the variance in HM and predict 0.590 increase in HM , the significant level is <0.05 and (F=149.263) , and the regression equation is (HM=1.822+0.590 TEF) therefore the result support the hypothesis 5 there is statistically significant impact of TEF on HM. Accordingly, the results support the study hypothesis and sub hypothesis .

Table 4: Regression Analysis Results

IV	β0	β1	R^2	Adj-R^2	F	sig	SE
SF	0.874	0.805	0.632	0.630	290.686	0.000	0.315
CUF	1.738	0.591	0.384	0.381	105.509	0.000	0.408
MAF	1.765	0.609	0.536	0.533	195.166	0.000	0.354
COF	1.826	0.583	0.477	0.474	154.155	0.000	0.376
TEF	1.822	0.590	0.469	0.466	149.263	0.000	0.379

DISCUSSION AND CONCLUSION

In recent years, the public healthcare sector in Iraq has suffered from the conditions of the war on terror, which have affected the provision of logistical and financial capabilities; Therefore, the private healthcare sector has emerged as a competitive alternative, requiring effective strategic tools [23]. Many studies ensures that it is beyond doubt that there is indeed a need to bridge the knowledge gaps by examining the relation between SF and HM . as such this study aims to identify the relationships that are significant for SF and HM , including the notion of how such this relationship can enhance HM. Iraq has undergone decades of war and unwavering sanctions from the United Nations. For example, Power failure grids as a result of the Gulf War in the 1990s and a decade of sanctions [24] were among the side effects on the hospitals and water; sanitary installations on which it depends on sufficient electricity supply.

Iraq is in the middle of the desert and therefore, traveling for most households and families in search for medical services is a huge challenge. The future of the Iraqi population is heavily dependent on the out of the pocket medical services which is provided by private firms[25]. Therefore having a medical system that is regulated by the government through subsidies and the provision of necessary facility promotes the growth of private sectors. The re-emergence of the medical facilities of Iraq is faced by many challenges among them is inadequate medical personnel [6]. The future of the Iraq medical system and marketing of private firms is positively modified by the factor of technology, competition, and clients. The results indicate that customer and market foresight have a positive impact on the success of healthcare marketing. Paying attention to the customer, providing good service, with a true vision of marketing positively affects the success of healthcare marketing. In addition to employing technology and enhancing competitiveness. Consequently, It is pretty clear that these tools play a vital role in healthcare marketing and therefore the health institutions should try all means available to invest on these four tools.

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REFERENCES

1. Ormond M, Han Lc. The Private Healthcare Sector In Johor: Trends And Prospects. Iseas-Yusof Ishak Institute; 2018 Jul 23.
2. Tarpey Mj. The Role Of The Us Army In Health System Reconstruction And Development During Counterinsurgency. Army Command And General Staff Coll Fort Leavenworth Ks; 2012 Jun 8.
3. Antonopoulos P, Cottle D. Syria: The Hegemonic Flashpoint between Iran and Saudi Arabia?. Vij Books India Pvt Ltd; 2017 Jun 5.
4. De Soete W, Jiménez-González C, Dahlin P, Dewulf J. Challenges and recommendations for environmental sustainability assessments of pharmaceutical products in the healthcare sector. Green Chemistry. 2017;19(15):3493-509.
5. Bricknell MC, Nadin M. Lessons from the organisation of the UK medical services deployed in support of Operation TELIC (Iraq) and Operation HERRICK (Afghanistan). Journal of the Royal Army Medical Corps. 2017 Aug 1;163(4):273-9.
6. Lafta R, Al-Ani W, Dhiaa S, Cherewick M, Hagopian A, Burnham G. Perceptions, experiences and expectations of Iraqi medical students. BMC medical education. 2018 Dec;18(1):53.
7. Hair Jr JF, Lukas B. Marketing research, McGraw-Hill Education Australia, 2014,(Vol. 2).
8. Kim WC, Mauborgne RA. Blue ocean strategy, expanded edition: How to create uncontested market space and make the competition irrelevant. Harvard business review Press; 2014 Jan 20.
9. Utaka A. High Price Strategy and Quality Signalling. The Japanese Economic Review. 2015 Sep;66(3):408-20.
10. Khan MT. The concept of'marketing mix'and its elements (a conceptual review paper). International journal of information, business and management. 2014 May 1;6(2):95.
11. Kotler P, Armstrong G. Principles of marketing. Pearson education; 2010.
12. Meissner D, Gokhberg L, Sokolov A. The meaning of foresight for science, technology and innovation policy. InScience, Technology and Innovation Policy for the Future 2013 (pp. 1-7). Springer, Berlin, Heidelberg.

13. Kapferer JN. The new strategic brand management: Advanced insights and strategic thinking. Kogan page publishers; 2012 Jan 3.
14. David A., The Nature of Strategic Foresight , Salve Regina university ,MGT581 business foresight and futuring.2012.
15. Fowler HL. Misapplied ethical considerations: US Federal stem cell mandates lack global focus and market foresight. Cornell Int'l LJ. 2003;36:521.
16. Carisch E, Rickard-Martin L, Meister SR. Emerging Threats and Sanctions: Abuses of Digital and Information Technologies. InThe Evolution of UN Sanctions 2017 (pp. 133-162). Springer, Cham.
17. Fahey L, Randall RM, editors. Learning from the future: competitive foresight scenarios. John Wiley & Sons; 1998.
18. Wirtz J, Lovelock C. Services Marketing: People, Technology. World Scientific Publishing Company; 2016 Mar 29.
19. Ariu A. Services versus goods trade: a firm-level comparison. Review of World Economics. 2016 Feb 1;152(1):19-41.
20. Hill N, Alexander J. The handbook of customer satisfaction and loyalty measurement. Routledge; 2017 Mar 2.
21. Kondasani RK, Panda RK. Customer perceived service quality, satisfaction and loyalty in Indian private healthcare. International Journal of Health Care Quality Assurance. 2015 Jun 8;28(5):452-67.
22. Kumar NP, Jacob A, Thota S. Impact of healthcare marketing and branding on hospital services. International Journal of Research Foundation of Hospital & Healthcare Administration. 2014;2(1):19-24.
23. Hadrawi HK. The Impact of Scenario Planning on Organizational Sustainability in Healthcare Private Sector. Indian Journal of Public Health Research & Development. 2018 Jun 1;9(6).
24. Hadrawi HK. Network Analysis Of The Effect Of Strategic Leadership On Organizational Success: Evidence From Iraqi Heavy Industry. Academy Of Strategic Management Journal. 2018;17(4).
25. Kavosi Z, Siavashi E. A Study of the Performance of Referral System in Urban Family Physician Program in Fars Province, Iran. Journal of Health Management and Informatics. 2018 Jul 1;5(3):88-95.

Study of the Organic Pollution in Euphrates River, Southern of Iraq

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ABSTRACT

Water pollution is one of the main problems that cause harm to man and his environment. In order to evaluate the quality of our inland water and the extent of its contamination with organic matter, this study was conducted.

Water samples were collected monthly from six selected stations on Euphrates river, three of them in Nasiriya city are Al-Sindinawiya, Al-Fadhliya and Souk Al-Shuyuk district. The other three were in Abu Al-Shulan, Al-Medana city center and Qurna district for the period from October 2017 to May 2018. Samples collected in 500 ml polyethylene bottles. The biological oxygen demand (BOD) was determined by the BOD Sensor after calibration and processing.

The results of the study showed that the values of BOD_5 had recorded the highest concentration in the first site of the study and amounted 47.5 mg/l either the lowest value was recorded in the fourth site (4.87) mg/l, as well as the values in the other four stations were 6 in S2, 7.12 mg/l in S3, 7.62 in S5, and 6.75 mg/l in S6, respectively. The values of BOD_5 during the months of the study ranged from 2 to 54 mg /l as lowest and highest value during the months of March 2018 and May 2018, respectively. The river water classified according to Hynes scale as doubtful clean in the fourth station, bad in the second, third, fifth and sixth stations, and very bad at the first station. In general, all study sites assessed as very bad (13.31) mg/l.

Statistically, there were significant differences between the values of the BOD_5 between stations at the probability level ($p \leq 0.05$), these significant differences not showed between the months.

Keyword: *Organic pollution, BOD_5, Euphrates river, Iraq.*

INTRODUCTION

Pollution is the contamination of the Earth components environment with materials that interfere with human health [(1)], either water pollution maybe it can be said that any undesirable change in the physical, chemical or biological properties of water lead to loss of favorite water qualities for living organisms [(2)]. Sewage is the main water pollution, which can be defined as a mixture of organic waste from several human activities such as food preparation, washing dishes, latrines, baths, laundry, house cleaning and bathing [(3)], and when discharged to water systems show a lot of problems in the water body.

Biochemical oxygen demand (BOD) forms the key indicator of organic load in any wastewater system. This property is expressed as the amount of dissolved oxygen required by aerobic biological organisms for degrading organic materials present in a given water sample at certain temperature over a specific time period [(4)]. When any type of organic material reaches the water body, the living organisms begin to break down and analyze this material. During this process, oxygen amount in the water is consumed through the breathing of aerobic organisms. The amount of consumption depends on the concentration of the organic load in the water. Thus a low BOD is an indicator of good quality while high BOD indicates polluted water [(5)]. Water quality classified depending on BOD_5 values to five class were very clean, clean, fairly clean, doubtful clean and bad [(6)].

As a result of the absence of any previous

environmental study on Euphrates river at Nasiriya and Basra cities, this indicator has been used to determine the water quality and organic pollution, and our current idea was selected.

MATERIALS AND METHOD

Description of study sites

Euphrates river is one of the main rivers in Iraq. The importance of Euphrates river has been highlighted since ancient times due to its varied uses in agriculture, fishing, water transport and trade. It penetrates most of Iraq's provinces. It has a length about 3000 km and penetrates the Iraqi cities with a length of 1160 km, equivalent to about 38.7% of the total length of the river.

Six sampling stations were identified along the river in Nasiriyah and Basra governorates (Figure 1). Three sites were selected within the geographical area of Dhi Qar, including the sample S1, this sample was taken from the area of Al-Sindinaoui near the center of Nasiriyah and this area is contaminated with sewage, there was a sewage station in the center of Nasiriyah, whose waste is drained into the river water. This area is characterized as an agricultural area. The sample site (S2) was taken from the center of Fadhliya area. This area is dominated by the agricultural character, where the sugarcane plant is abundant on the river, there are also cages for raising fish. Third sample (S3) was in the center of the Souk al-Shuyuk district near (Al-Sabra Bridge). This area is characterized by occurred a large number of human activities and large quantities of city waste discharged to the river.

In Basra province, three sites were selected within this geographical area. The site of sample (S4) was within between Chabaish and Medina district in an area called Abu Shulan, this area is an extension of the marshes in Dhi Qar and Basra provinces. The location of the sample S5 was at Medina district center (below the bridge). This area is characterized by many sources of pollution from sewage, waste accumulated as well as operations water from oil companies located near the river and its waste. Finally, the location of sample S6 was in Qurna district in Oujan Pasha area, about 4 km from the confluence of the Tigris River in the Euphrates in the Shatt al-Arab and This area is characterized mostly as agricultural areas free from sources of pollution, both civil and industrial.

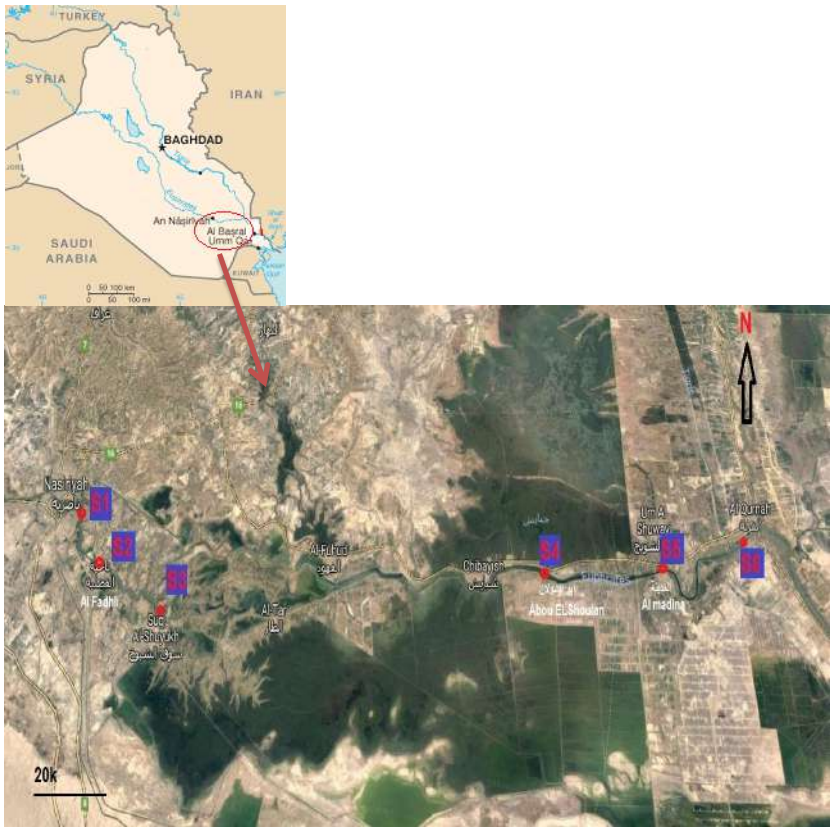

Figure (1): Study sites on Euphrates river in Nasiriyah and Basra provinces.

MATERIALS AND DEVICES

In the present study, the BOD sensor method, which includes a set of substances and tools such as nitrification inhibitor, NaOH, bottle for setting sample size, dark sample bottle, magnetic stripe, rubber cover, the base of carrying the bottles, specific incubator and sensor , was used to determine the biological oxygen demand in the water of Euphrates river.

Procedures

The test is conducted in airtight bottles 500ml capacity in the absence of light and under a controlled temperature (20± 1°C) for 5 days by take 432ml from water samples, the results take directly from sensor display and multiplying suitable factor, were expressed as (mg/l).

Statistical analysis

The significance of the differences, whether study site differences or monthly differences, were determined by variance analysis method, using the Statistical Package for the Social Sciences (SPSS) version 20 at the probability level ($p \leq 0.05$) [7].

RESULTS AND DISCUSSION

The results of the study showed a difference in the values of the biological oxygen demand between stations (4.87-47.5 mg/l) (Fig. 2). Statistical analysis results indicate that there were significant differences between the stations ($p \leq 0.05$), and the values varied within the study months and recorded the highest in May 2018 in S1 (54 mg/l), and the lowest in March 2018 at the second sites (2 mg/l) (Fig. 3).

The results of S1 recorded clearly changed compare with other sites, BOD_5 values in this site was 47.5 mg/l as mean (Fig. 2), and the water quality was very poor according to Hynes due to its proximity to the wastewater treatment plant in Nasiriya about 200 meters from the treatment plant and this shows not found true treatment processing or may exist but inefficient, as well as increasing the concentration of phosphates causes appearance eutrophication phenomenon which adversely effects on the values of oxygen in river water and this was confirmed by [8].

Second site results indicated that the value of BOD_5 was bad (6 mg/l) as mean (Fig. 2), although this area was free from human activities and industrial pollutants, but agricultural pollutants which discharge to river water may contribute significantly to organic pollution, which effects on the value of BOD_5 in the waters, this is consistent with [9] which show in his study that spread of fish ponds in water body contribute significantly to the growth of neighborhoods that causes deplete dissolved oxygen in the water and that's appearing during the study period.

The third site recorded relatively high BOD_5 values compare with S2, the value was 7.12 mg/l (Fig. 2) and this value is classified as bad water may be the reason was characterize the study area with increasing human activity and discharge large amounts of city waste to the river water. Research showed that population and industrial activities to contribute significantly in the emergence of organic pollution in nearby water bodies on such activities [10], and this is consistent with the current study results.

The fourth site recorded the lowest rate of BOD_5 values (4.6 mg/l) (Fig.3), this may be caused by dilution factor as this region was extension for marsh area and low organic contamination which may result from the activities of the same organisms that live in the study area [11].

BOD_5 values in S5 was 7.62 mg/l as mean (Fig. 2), this due to the sources diversity of pollution which arrived to the river water such as sewage and waste accumulated as a result of population activities, may be the main reason for organic pollution increasing [12], as well as, the high proportion of salt and the oil companies remnants up to river water which may directly affect the percentage of oxygen dissolved in water through the formation of oily layers that act as soundproofing affects BOD_5 and dissolved oxygen values in river water.

The results mean of BOD_5 in the sixth site was 6.75 mg/l (Fig. 2), the study area was marked as agricultural area, fertilizers and pesticides were used in it and near the banks of the river, which leads to high concentration of organic substances and various nutrients. As results indirectly organic pollution leads to an increase in the values of BOD_5.

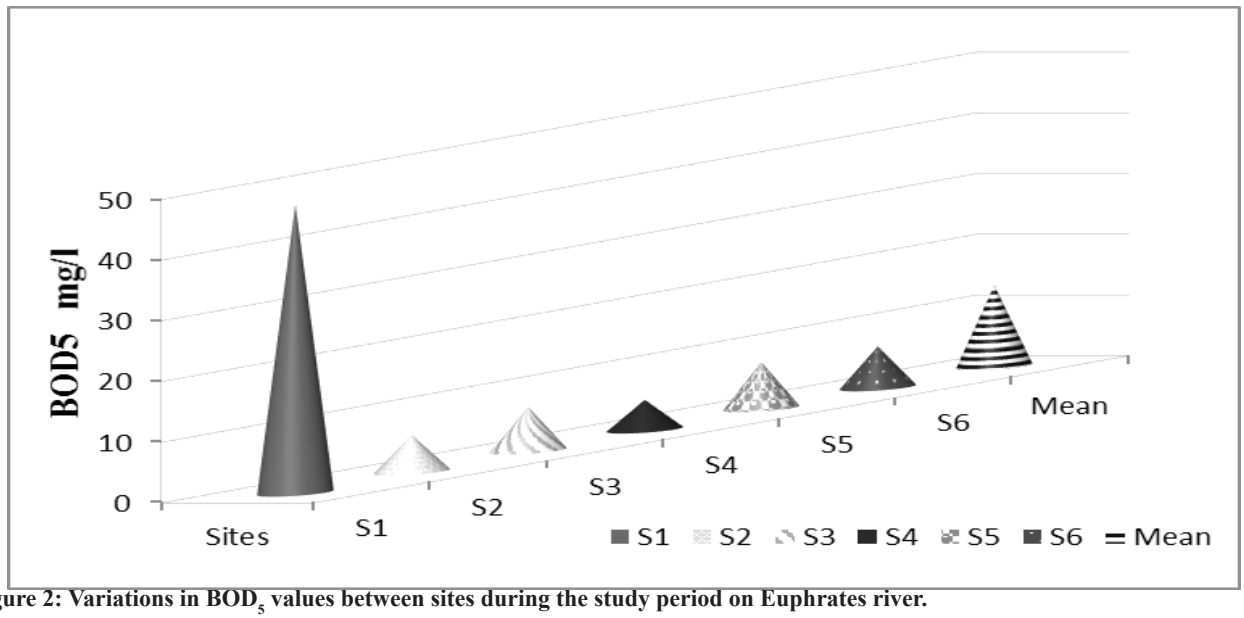

Figure 2: Variations in BOD_5 values between sites during the study period on Euphrates river.

The result of BOD_5 values during the months of October 2017, November, December, January 2018, February, March, April and May were 12.66, 14, 14.83, 13.16, 11.33, 10.66, 12.83 and 17 mg/l, respectively. BOD_5 values results during the months of study were fairly close together (Fig. 3, 4) and did not show any significant differences ($p \leq 0.05$) and were generally tend to decline in values during winter season (Fig. 4). These decreasing may be related with water temperature which recorded low degrees when moving from autumn to winter months, beside an increase in dissolved oxygen concentrations, which in turn effect on the BOD_5. In March month, the decline may be linked to increased rainfall which worked as dilution factor although high temperature resulting a significant increase in water levels which in turn led to a decrease in the BOD_5 values, this pointed out by [13] in his study.

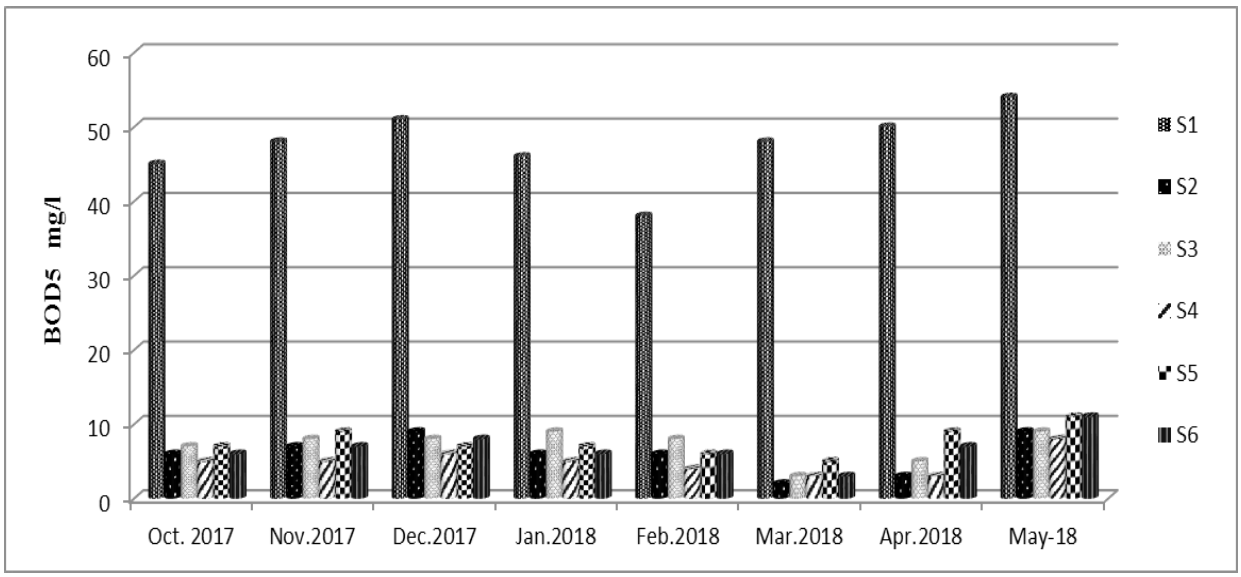

Figure 3: Variations in BOD5 values between months during the study period on Euphrates river.

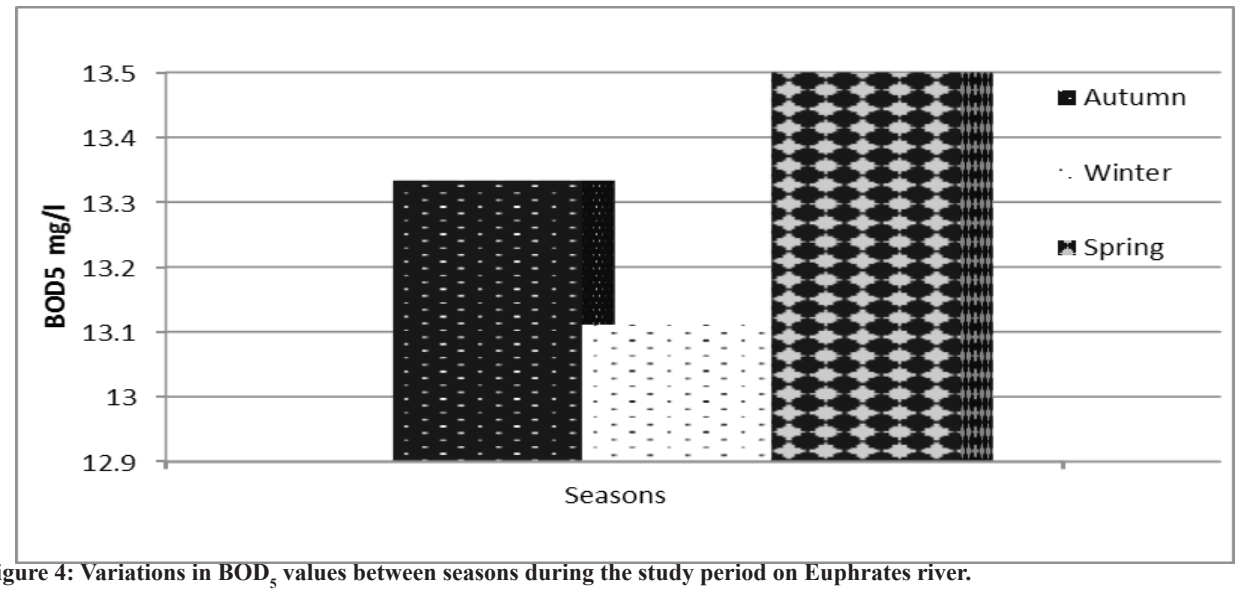

Figure 4: Variations in BOD_5 values between seasons during the study period on Euphrates river.

CONCLUSIONS

The water of the Euphrates River in the studied area is questionable in terms of its organic content and the quality of water in some stations is very bad.

The results showed significant differences between the studied stations, while the climatic conditions had no significant effect on BOD_5 values.

The river has high energy through self-purification and disposal of pollutants.

Conflict of Interest: Nil

Source of Funding: Self-funding.

Ethical Clearance: The current research aims to assess the quality of the Euphrates river and determine the level of organic pollution within the study areas and during the research period to identify the state of the river health and protecting the human from the damage that may be caused by the consumption of contaminated water. If you have additional questions or clarifications, please contact us by e-mail: alialfanharawi@mu.edu.iq

REFERENCES

(1) Olafisoye O. Estimation of Organic Pollution of Odo Oba River (Osun State, Nigeria). Chem. Sus. Develop. 2011; 19: 355.1.

(2) Al-Fanharawi AA. Biochemical and molecular alternations of two freshwater Mollusca species as a biomarkers for the effect of some water pollutants in Hilla river, middle of Iraq. PhD dissertation, Science college, Baghdad university; 2018.

(3) Okuku EO, Ohowa B, Mwangi SN, Munga D, Kiteresei LI, Wanjeri VO, et al. Sewage pollution in the coastal waters of Mombasa City, Kenya: A norm rather than an exception. Inter. J. of Environ. Res. 2011; 5: 865-4.

(4) Sawyer CN, McCarty PL. Chemistry for Environmental Engineering. New York, USA: McGraw-Hill Book Company; 1978.

(5) Robson MG. Biological Oxygen Demand. Encyclopedia of Public Health; 2000

(6) Hynes H. The biology of polluted waters. UK: Liverpool university press; 1974.

(7) Al-Rawi KM, Abdul Aziz K. Design and analysis of agricultural experiments. Mosul University, Iraq: Dar Al- Kutub presses for printing and publishing; 1980.

(8) Emongor V, Kealotswe G, Koorapetse I, Sankwasa S, Keikanetswe S. Pollution indicatorin Gaberone effluent .J. of App. Sci. 2005; 5:147-150.

(9) Weiner ER. Application of environmental chemistry. London: Lewis publishers; 2000.

(10) Howard AG. Aquatic environment chemistry. UK: Oxford Science Publications; 1998.

(11) Nergis YM, Akhtar NA, Hussain A. Quality characterization and magnitude of pollution implication in textile mills effluents. J. of Qual.

and Tech. Man. 2009; 11: 27-40.

(12) Boluda R, Quintainilla JF, Bonilla JA, Seaz E, Goman M. Application of the Microtox test and pollution Indices to the study of water toxcity in the Albufera Natural park (Valencia, Spain). Cheom. 2002; 46:355-9.

(13) Mashkor S. Impact of Heavy and Industrial Water on Samawa City on Pollution of Euphrates River, Qadis. J. 2002; 7 (2): 38-29.

International Patients Safety Goals (IPSG) based on Knowledge Management of SECI (Socialization, Externalization, Combination and Internalization) on Adverse Events at Jakarta Islamic Hospital

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ABSTRACT

Introduction: The performance of nurses determines patient safety and also a contribution of the knowledge possessed by nurses. Proper Knowledge Management will improve nurse performance. There have been many types of research about nurses' work, but research on the performance of knowledge management nurses: Socialization, Externalization, Combination and Internalization (SECI), does not yet exist. The purpose of this study was to determine the effect of performance on the goal of patient safety based on *knowledge management of SECI* on the adverse events in Jakarta Islamic Hospital. **Method:** The research design used a *quasi experiment pre post-test with the control group.* The number of samples in the intervention group was 24 respondents and the control group was 37 respondents. Instruments that are used for patient safety and adverse events with performance interventions based on *knowledge management of SECI* patient safety goals. The analysis used the *Mann Whitney* and *Willcoxon* statistical *tests*. **Result:** the study showed that work duration was a factor that affected patient safety, there were changes in patient safety before and after the intervention in the intervention group compared to the control group. There is a difference between the intervention group and the control group after being given performance interventions in *Knowledge Management: SECI* patient safety goals. **Conclusion:** this study recommends regular training for nurses about performance in patient safety: *SECI*-based patient safety goals and further research for different control groups of hospitals with the intervention group.

Keywords*: Target of patient safety, knowledge management: SECI, performance, nurse*

INTRODUCTION

The quality of hospital health services is largely determined by the quality of nursing services as a determining factor in the image of health care institutions. As nurses are the most number of professional groups, the foremost, closest and longest with patients and their families[(1)] in the process of achieving their health. One indicator of the quality of nursing services is patient satisfaction. Satisfaction is a comparison between the quality of service obtained with the desires, needs and expectations[(2)]**.** In addition, satisfaction Indicators of service quality can also be seen in efforts to achieve *patient safety*.

The high quality of nursing services can be achieved by increasing nursing services[(3)], namely providing health services efficiently and effectively in accordance with professional standards, carried out service standards comprehensively in accordance with patient needs, utilising appropriate technology and research results in the development of health services so that an optimal level of health is achieved[(4)]. The final results that will be measured are patient satisfaction and safety efforts of patients conducted by a nurse at the hospital, and these efforts demonstrate the achievement of the work in line with expectations, known as performance.

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Nurses performance will provide high results of work achievement that is strongly influenced by various factors, including the work system that is applied to the hospital[5–7], adequate employment resources and the characteristics of nurses in the form of *knowledge*, skills, abilities to act, motivation, attitudes, norms and values adopted. Nurse knowledge is the main element of nurse characteristics in achieving performance explain that service quality is related to effectiveness, timeliness, benefits, efficiency, sustainability and consistency of nursing services provided to patients, families and society[8,9]. This shows that the quality of nursing services is influenced by the performance of nurses. Nurse performance is based on guidelines and standards that have become a reference in nursing services. As a reference, performance can also be seen from the aspects of *patient safety*, which is the achievement of *patient safety* goals.

The concept of managing knowledge (*Knowledge Management*) is currently getting much attention from researchers as a new study to find other models in solving nursing management problems[10]. Knowledge of the nurses in *patient safety* regarding the six goals of patient safety will be a positive impact for nursing services in general[11].

Previous study in patients with elective surgery in the operating room ward of the Central General Hospital found the error of commission at 60% prophylactic antibiotics and 90.5% error of omission[12]. Previous study in 2011 found a unexpected incident of 26.3% and a near-injury incident of 73.7%. The forms of those incidents are non-conformity of patient identification, errors in drug administration (wrong patients, types of drugs), blood samples of patients exchanged and patients falling[13]**.** Based on the preliminary study in December 2015 obtained the number of patient safety indicators based on patient safety reports in 2014 that there were Potential Injury Incidence of two events (18%), for Events of Near Injury were two events (18%), Non-Injury Events were three events (27%), there were four Unexpected Events (36%), and Sentinel was 0%.

Based on the background, to improve the performance of nurses so that the quality of nursing services is better, there have been many studies on the performance of nurses, but research on the effect of nurses' performance in *Knowledge Management*-based Patient Safety: SECI on the Quality of Nurse Nursing Services, does not yet exist.

MATERIAL AND METHOD

This study is aimed to answer specific objectives: analysis of the effect of nurses' performance in the *Knowledge Management*-based Patient Safety Goals: SECI on Nursing Service Quality (patient safety, unexpected events), after being given intervention.

Research design

The design of the research is a *quasi-experiment* with *pre- and post-test with control group* research design which aims to test the effect of nurses' performance in patient safety goals based on *knowledge management*: SECI on service quality in nursing by measuring the quality of nursing services before (*pre-test*) and after (*post-test*) giving intervention (14,15).

Data Collection

The preparation stage was then developed to prepare a training module in the form of nurse performance in patient safety goals and *knowledge management* based on patient safety goals: SECI. Furthermore, at the implementation stage, training was held for two (2) days in providing knowledge of nurses' performance in the goals of patient safety and patient safety goals based on *knowledge management*: SECI. After getting the training this was followed by an independent learning process, in the form of the application of the training results on their own for one week in order to apply the knowledge gained about the performance of nurses in the patient safety goals based on *knowledge management*: SECI. After the independent application is carried out, an evaluation of the knowledge about the results that have been obtained can be found by looking at the patients' safety and unexpected incident index.

RESULT

The results of the study are based on the characteristics of respondents, which include age, income and length of work, as described in Table 1.

Table 1. Respondent equality test based on age, income and length of work at Jakarta Islamic Hospital Pondok Kopi (n1 = 24, n2 = 37)

Based on the results of the analysis of Table 1, it was found that the average age of the intervention group

and the control group were in the early adult range and entered middle adulthood; the average income of the intervention group is greater (Rp. 5,529,166.67) compared to the control group (Rp 4,313,514,51) and the duration of the intervention group was longer (15.88 years) than the control group (11.08 years). Equivalence statistical test results of the intervention group and control group are equivalent to p-value> 0.05.

The results of research based on patient safety include the accuracy of patient identification, effective communication improvement, increased drug safety monitoring, precise location (side), proper procedure and right patient surgery, reduction of risk of infection through the six steps of hand washing, and reduction of risk of patients falling before getting intervention in Jakarta Islamic Hospital (n1 = 24, n2 = 37) as described in Table 2.

Table 2. Respondents distribution of Patients Safety Performance (n1 = 24 , n2 = 37)

Variable	Intervention group		Control group	
	F	%	F	%
The accuracy of patient identification				
Less precise	6	25	6	16.2
Right	18	75	31	83.8
Improved effective communication				
Less precise	13	54.2	9	24.3
Right	11	45.8	28	75.7
Improved drug safety that needs to be monitored				
Less effective	14	58.3	3	8.1
Effective	10	41.7	34	91.9
The certainty of exact location (side), proper procedure and right patient surgery				
Less precise	0	0	1	2.7
Right	24	100	36	97.3
Reducing the risk of infection through the six steps of hand washing				
Less risk of infection	0	0	2	5.4
Risk of infection	24	100	35	94.6
Reducing the risk of patients falling				
Less risk of falling	4	16.7	8	21.6
Risk of falling	20	83.3	29	78.4

Based on the results of Table 2, statistical tests obtained the highest value of the intervention group and the control group close to the same as regard to exact location (side), proper procedure and right patient surgery, reduction of risk of infection through the six steps of hand washing and reducing the risk of patients falling. The aspects that are still lacking are in the accuracy of patient identification, improved effective communication, improved drug safety that needs to be monitored in the intervention group, and are perceived to be less than in the control group. *The cut off points* use the median due to abnormal distribution For the relationship between characteristics of patient safety and the interaction between characteristics, see Table 3.

Table 3. Analysis of the relationship of characteristics with patient safety in Jakarta Islamic Hospital (n1 = 24, n2 = 37)

Variable	p value
Patient safety in the intervention group - Age - Length of working - Income - Education - Work - Gender	 0.863 0.953 0.869 0.692 0.625 0.620
Control group patient safety - Age - Length of working - Income - Education - Work - Gender	 0.159 0.129 0.563 0.380 0.692 0.225
Intervention group - Age with work duration - Age with income	 0,000 0,000
Control group - Age with work duration - Age with income	 0,000 0,000

Based on the results of the statistical test shown in Table 3. it was found that, in both the intervention group and the control group, with patient safety there was no significant relationship (p> 0.05). While the results of the interaction test between age and length of work and income have a significant relationship (p = 0,000) both in the intervention group and the control group.

Table 4. Statistical test changes in patient safety before and after being given intervention (n1 = 24, n2 = 37); n1 = intervention group, n2 = control group

Variable	Positive differences	Negative differences	Elementary school error	SD test statistics	p value
Patient safety before and after the intervention in the intervention group	18	6	26,091	3.53	0,000
Patient safety before and after giving intervention to the control group	12	25	26,384	1.57	0.116

Based on the statistical test results in Table 4 it was found that the change in positive understanding of patient safety in the intervention group after the intervention was increased compared to the control group, with the standard deviation error approaching the same. The results of the analysis showed that there were changes in patient safety before and after the intervention of nurses' performance in the *knowledge management* target of patient safety: SECI in the intervention group (p = 0.000), whereas in the control group there was no change in changes in patient safety before and after the nurse performance intervention in the patient safety goals based on *knowledge management*: SECI (p = 0.116).

Table 5. A statistical test of differences in patient safety in the intervention group and control group after being given intervention (n1 = 24, n2 = 37) n1 = intervention group, n2 = control group

Variable	Mean rank	Statistical test	Elementary school error	SD test statistics	p value
Patient safety after giving intervention to the intervention group and control group					
- Less	16.28				
- Good	10.23	33.5	14.67	-2.32	0.021

Based on the results of statistical test shown in Table 5, it was found that the difference in understanding patient safety in the intervention group was better than the control group after being given intervention in the performance of nurses in patient safety goals based on *knowledge management*: SECI, with a standard deviation error of 14.67. The results of the analysis showed that there were differences in patient safety in the intervention group and the control group after being given intervention in the performance of nurses in patient safety goals based on *knowledge management*: SECI (p = 0.021).

The results of statistical tests about events were not expected in the intervention group and the control group after being given intervention in the performance of nurses in the patient safety goals based on *knowledge management*: SECI in Table 8 below:

Variable	percentage
Drug safety that needs to be monitored	100
The certainty of location, procedure and patient surgery	100
Infection prevention and control	0.08
The accuracy of patient identification	0
Risk of infection	0
Risk of falling	0
Decubitus event number	0
Restrain injury incidence rate	Not monitored
Phlebitis event figures	0
Near injury events (KNC)	0

Table 6 Unexpected event statistical tests after being given intervention in the performance of nurses in the patient safety goals based on *knowledge management*: SECI in Jakarta Islamic Hospital. Based on the results of the statistical test in Table 6, it was found that only 0.08% of infection prevention and control about unexpected events was still found after the intervention, while others were not found

CONCLUSIONS

The conclusion of the study is that the initial knowledge about the target of patient safety in the intervention group and the control group is less different. The factor that most influences patient safety is the length of work, whereby the longer they work the respondent is expected to understand more about patient safety. Changes in patient safety before and after giving intervention to the performance of nurses in the Patient Safety Target based on *knowledge management*: SECI in the intervention group was better and more significant than the control group. The difference in understanding patient safety in the intervention group was better than the control group after being given intervention in the performance of nurses in the patient safety goals based on *knowledge management*: SECI. The results of the analysis found that there were differences in patient safety in the intervention group and the control group after being given intervention in the performance of nurses in patient safety goals based on *knowledge management*: SECI. Concern is still found in unexpected events about infection prevention and control that needs to be corrected

RECOMMENDATIONS

Nurse Performance in Patient Safety Goals based on *knowledge management*: SECI, can be suggested as follows:

- Nurses' knowledge through scientific activities in the form of training, learning from literature sources, discussions of abilities that have been carried out related to the performance of patient safety goals

- Nurse leaders to hold regular training on the performance of nurses in the Patient Safety Goals based on *knowledge management*: SECI

- Education can develop educational applications in the form of subjects that teach about nurses in the Patient Safety Goals based on *knowledge management*: SECI

- Nurse Ability in Patient Safety Goals based on *knowledge management*: SECI can improve with effective communication and teach the six steps of hygiene

Conflict of Interest: No conflict of interest during the study.

Ethical Clearance: This study has been accepted for ethical clearance from Universitas Muhammadiyah Jakarta with no: 591/PMK-UMJ/VI/2017.

Source of Funding: This study was not receive funding. This study was self funding.

REFERENCES

1. Delucia PR, Ott TE, Palmieri PA. Performance in Nursing. Sage J. 2009;
2. Nursalam. Konsep dan penerapan metodologi penelitian ilmu keperawatan: pedoman skripsi, tesis, dan instrumen penelitian keperawatan. Salemba Medika; 2008.
3. Aiken LH, Sloane DM, Ball J, Bruyneel L, Rafferty AM, Griffiths P. Patient satisfaction with hospital care and nurses in England: an observational study. BMJ Open. 2018;8(1).
4. Nursalam. Manajemen Keperawatan: Applikasi dalam praktik Keperawatan Profesional. Jakarta: Salemba Medika; 2015.
5. Izumi S. Quality improvement in nursing: Administrative mandate or professional responsibility? Nurs Forum. 2012;47(4).
6. Negussie N, Berehe C. Factors affecting performance of public hospital nurses in Addis Ababa region, Ethiopia. J Egypt Public Health Assoc. 2016;91(1).
7. Terzioglu F, Temel S, Sahan FU. Factors affecting performance and productivity of nurses: professional attitude, organisational justice, organisational culture and mobbing. J Nurs Manag. 2016;
8. Brown D, Edwards H, Seaton L, Buckley T. Lewis's Medical-surgical Nursing: Assessment and Management of Clinical Problems. Elsevier Health Sciences; 2015.
9. Huber DL. Leadership and nursing Care

management. 3rd ed. USA: Elsevier; 2006.

10. Earl M. Knowledge management strategies: toward a taxonomy. J Manag Inf Syst. 2001;18(1):215–233.
11. Attree M, Cooke H, Wakefield A. Patient safety in an English preregistration nursing curriculum. Nurse Educ Pract. 2008;8(4):239–248.
12. Reich BH, Gemino A, Sauer C. Knowledge management and project-based knowledge in it projects: A model and preliminary empirical results. Int J Proj Manag. Elsevier; 2012;30(6):663–74.
13. Reich BH, Gemino A, Sauer C. How knowledge management impacts performance in projects: An empirical study. Int J Proj Manag. Elsevier; 2014;32(4):590–602.
14. Polit DF, Beck CT. Nursing research: Principles and methods. Lippincott Williams & Wilkins; 2004.
15. Creswell JW, Creswell JD. Research design: Qualitative, quantitative, and mixed methods approaches. Sage publications; 2017.

Factors Affecting The Side Effects of Anti-Tuberculosis Drugs

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ABSTRACT

Side effects of Anti-Tuberculosis Drugs is a problem in the treatment of tuberculosis patients. In Barru Regency, the number of pulmonary TB patient visits in the outpatient and inpatient units in 2014-2016 was still high. Based on these data, it is deemed necessary to conduct research on the causes of cure rates in only 73% of the total users of pulmonary TB drugs, in terms of the side effects of anti-tuberculosis drugs, pulmonary disorders and gastric disorders.This study was conducted on Agustus, 2017 to January, 2018; using cross sectional approach. Subject of this study were 75 tuberculosis patients with BTA+ and side effects of Anti-Tuberculosis Drugs on the lungs and stomach, selected by total sampling. Data were obtained through interview, then analyzed by using path analysis. It is known that the pathways of influence were significant (T-value> 1.96) were knowledge on immune system, type of drug on immune system, knowledge on side effect of drug and type of drug on side effect of drug. Thus, the level of knowledge and types of drugs directly affect the immune system, as well as the side effects of drugs. Several factors that directly affect the side effects of anti-tuberculosis drugs are the level of knowledge and type of drug. Increased knowledge will reduce the side effects of the drug, because the patient makes an effort to neutralize the effect.

Keywords: *Side effects, Anti-tuberculosis drug, Tuberculosis, Knowledge*

INTRODUCTION

Tuberculosis (TB) is a chronic granulomatous infectious disease caused by the bacillus Mycobacterium tuberculosis bacilli (Mtb) which was discovered by Robert Koch in 1882.[(1),(2)] TB is an age old dreadful disease and globally, there were an estimated 10.4 million new TB cases with 1.8 million TB deaths in 2015.[(1)] Twenty five percent of all deaths caused by pulmonary tuberculosis disease and it has become the leading cause of death on infectious diseases.[3]

The high incidence of pulmonary TB is a major problem for many countries in the world. WHO (2015) explains that 9.6 million of the world's population are infected with TB bacteria and the most cases of pulmonary TB are in Africa (37%), Southeast Asia (28%), and the Eastern Mediterranean (17%). Indonesia ranks fifth in the world as a contributor to TB sufferers after India, China, Nigeria and Pakistan[(4)].

TB prevalence in Indonesia in 2013 (297 / 100,000 population) was higher than in 2010 (289 / 100,000 population). regions with the highest TB cases were West Java, East Java and Central Java, with smear positive cases of almost 40% of the total cases in Indonesia[(5)]. Morbidity and mortality due to TB are serious problems, especially due to the emergence of side effects of anti-tuberculosis drugs and most The patient felt unable to resist the side effects of the drug[(6-8)]. It was noted that 69.01% of patients experienced side effects of the drug[(8)]. Side effects that often arise are stomach disorders (loss of appetite, nausea, stomach ache). Other disorders include joint pain, tingling and burning in the legs and redness of the urine. More severe side effects include tightness, severe hemoptysis, collapse, bronchiectasis, pneumothorax, and cardio pulmonary insufficiency,

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itching and redness of the skin, deafness, balance disorders, visual disturbances, confusion and vomiting, purpura and shock[9].

The number of TB patients with smear + is 8.470%, the Case Notification Rate (CNR) of new cases of TB with smear + per 100,000 population is 97.98%, while the total number of TB cases in South Sulawesi is 12.625%[10]. The partnership effort to reduce TB prevalence is an effort to eliminate pulmonary TB. Pulmonary TB prevention strategy is Directly Observed Treatment Shortcourse (DOTS) and has been implemented thoroughly in Indonesia since March 24, 1999. The impact or side effects of anti-tuberculosis drugs is one of the risk factors for default[11-12].

Pulmonary TB treatment aims to cure patients and improve productivity and quality of life, prevent death, prevent recurrence, break the chain of transmission and prevent the transmission of drug-resistant pulmonary TB. Handling of the high prevalence of pulmonary TB must be done to control this disease, one of which is treatment. Drug therapy problems in pulmonary TB patients require special attention because patients consume a lot of drugs and in large doses. In one study, the incidence of drug therapy problems in the category of unwanted drug reactions or adverse drug reaction (ADR) was quite high[13].

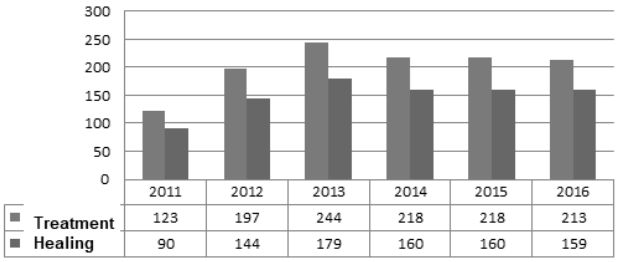


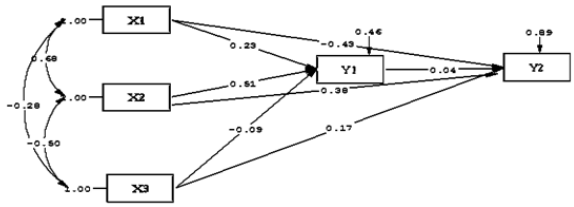
Figure 1. Trend of New Pulmonary TB Patient in Barru Regency 2011-2016[14]

The number of pulmonary TB patient visits in the outpatient and inpatient units in 2014-2016 was still high. Based on these data, it is deemed necessary to conduct research on the causes of cure rates in only 73% of the total users of pulmonary TB drugs, in terms of the side effects of anti-tuberculosis drugs, pulmonary disorders and gastric disorders.

METHOD

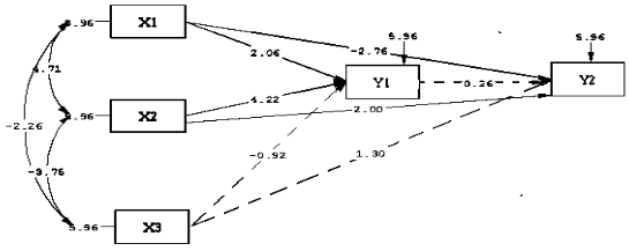
This study was conducted on Agustus, 2017 to January, 2018; using cross sectional approach. Subject of this study were 75 tuberculosis patients with BTA+ and side effects of Anti-Tuberculosis Drugs on the lungs and stomach, selected by total sampling. Data were obtained through interview, then analyzed by using path analysis.

RESULTS



Note: X1 = knowledge, X2 = type of drug, X3 = dose of drug, Y1 = immune system, Y2 = drug side effects

Figure 2. Path coefficient of path analysis



Note: X1 = knowledge, X2 = type of drug, X3 = dose of drug, Y1 = immune system, Y2 = drug side effects

Figure 3. T-value of path analysis

Based on Figures 2 and Figure 3 it is known that the pathways of influence were significant (T-value> 1.96) were X1→Y1, X2→Y1, X1→Y2 and X2→Y2. Thus, the level of knowledge and types of drugs directly affect the immune system, as well as the side effects of drugs.

DISCUSSION

The results of data analysis showed that the level of knowledge directly affects the side effects of TB drugs on the lungs and stomach. The effect given is a negative influence, which means that if the level of knowledge increases then the side effects of the drug will decrease. In this regard, Handarini reports that respondents with good knowledge are more likely to be more obedient to taking medication[15].

This research is also in accordance with Notoatmodjo's (2010) statement that one's actions about a health problem will basically be influenced by one's knowledge of the problem. In this case, the higher the level of knowledge possessed by TB patients, the higher the patient's compliance with treatment[16].

The results showed that the type of drug did not affect the side effects of the drug. This is because most patients stop taking the drug because they cannot stand the side effects of the drug.

The anti-TB drug exhibits greater level of efficacy with a satisfactory degree of toxicity; however combination treatment, especially during the intensive phase of therapy may produce severe adverse events[17]. There may be considerable morbidity, even mortality, particularly with drug-induced hepatitis. These events may include substantial costs due to added visits, tests, and in more serious instances of hospitalizations[18].

Standard anti-TB therapy typically continues for six months. For the first 2 months, three to four drugs receive patients, namely rifampin (R), isoniazid (H), pyrazinamide (Z), and, in some cases, ethambutol (E). During the final 4 months, they continue with rifampin and isoniazid[19].

Tuberculosis is considered a serious disease, it can even be fatal if not treated properly. The treatment step given is the administration of antibiotics that must be spent by tuberculosis patients for a certain period of time according to a doctor's prescription. Common types of antibiotics are isoniazid, rifampicin, pyrazinamide and ethambutol. Like other antibiotics, antibiotics for tuberculosis also have side effects, especially rifampicin, isoniazid, and ethambutol. Rifampicin can reduce the effectiveness of hormonal contraceptives, ethambutol can interfere with the function of vision and isoniazid has the potential to damage nerves. A number of other side effects of anti-tuberculosis drugs are nausea, vomiting, decreased appetite, jaundice, dark urine, fever, rash, and skin itching[9,20].

The healing period for tuberculosis varies depending on the patient's health condition and the severity of the disease. The condition of the patient generally starts to improve and stop contagious after taking antibiotics for 2 weeks. To ensure complete recovery, TB patients must use antibiotics given by doctors for 6 months. If the patient does not take the medicine as recommended or stops taking it before the recommended time, the bacteria may not be able to completely disappear, even though the patient feels that his condition has improved. Patients with tuberculosis have the potential to become resistant to antibiotics. If this happens, the condition becomes more dangerous and difficult to treat. Thus, the healing period also becomes much longer.

The results showed that the dose of the drug had no effect on the side effects of the drug, either directly or indirectly, because the number of tuberculosis patients who stopped taking the drug due to the occurrence of disturbing side effects, so that many patients felt that they did not fit the drug[21-22]. This causes a healing failure so the patient must repeat the treatment. Another thing that causes no side effects of drugs when taking anti-tuberculosis drugs is because the dosage of tuberculosis medication is adjusted to the patient's weight, and there is prevention to using a single drug. The immune system does not play a role in resistance and side effects of anti-tuberculosis drugs[21-24].

Treatment with anti-tuberculosis drugs also concerns the suitability of the number of tablets swallowed by the patient's body weight, which consists of 4 groups, namely 30-37 kg, 38-54 kg, 55-70 kg, and ≥ 71 kg. The more weight the patient has, the more tablets must be swallowed and the higher the dose. The administration of anti-tuberculosis drug dosage is seen from the presence or absence of the patient's physiological and pathological conditions that prevent the use of drugs (contraindications)[25-26].

The results showed that the immune system had no effect on the side effects of the drug. The results of this study are different from the results of research conducted by Inez Clarasanti, Marthen CP Wongkar, Bradley J. Waleleng (2016) that in the use of anti-tuberculosis drugs (rifampicin, isoniazid, pyrazinamide and ethambutol / streptomycin) side effects complicate treatment targets. Common liver function tests include aspartate transaminase (AST) or more commonly referred to as serum glutamic-oxaloacetic transaminase (SGOT), and alanine transaminase (ALT) which is usually referred to as serum glutamic-pyruvic transaminase (SGPT). SGOT and SGPT show improvement if damage or inflammation occurs in liver tissue. SGPT is more specific to liver damage than SGOT. A slight increase (up to twice the normal rate) of SGOT and SGPT concentrations is often found. If the concentration of SGOT and SGPT is more than twice the normal number, it is considered meaningful and requires further examination. If there is an increase in transaminase enzyme concentration, there is an indication of malnutrition[27].

CONCLUSION

Several factors that directly affect the side effects of anti-tuberculosis drugs are the level of knowledge and type of drug. Increased knowledge will reduce the side effects of the drug, because the patient makes an effort to neutralize the effect.

ADDITIONAL INFORMATIONS

Ethical Clearance: from Ethics Committee of Institute of Health Science "Maluku Husada"

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Conflict of Interest: None

REFERENCES

1. Agarwal R, Goel A, Rai J, Kajal NC. Pharmacovigilance of First Line Anti-tubercular Therapy in Category I Patients of Pulmonary Tuberculosis. Int J Basic Clin Pharmacols. 2017;6(3):643-647.
2. Masriadi. Epidemiology of Infectious Diseases. Jakarta: Rajawali Press; 2014.
3. Masriadi, Mallongi A, Ibrahim J. Surveillance System Model for Pulmonary Tuberculosis Suspected in Pangkep Region, Indonesia. Current. Research in Tuberculosis. 2017;9(1):1-7.
4. WHO. Global Tuberculosis Report 2015. Geneva: WHO, 2015.
5. Riza LL, Sukendra DM. Relationship between Smoking Behavior and Chronic Failure in Patients with Pulmonary Tuberculosis at the Community Lung Health Center (BKPM) Semarang Region (Hubungan Perilaku Merokok dengan Kejadian Gagal Konversi Pasien Tuberkulosis Paru di Balai Kesehatan Paru Masyarakat (BKPM) Wilayah Semarang). Public Health Perspective J. 2017;2(1):89-96.
6. Cavalcante SC, et al. Community Randomized Trial of Enhanced DOTS for Tuberculosis Control in Rio de Janeiro, Brazil. Int J Tuberc Lung Dis. 2010;14(2):203- 209.
7. Marx FM, et al. The Rate of Sputum Smear-Positive Tuberculosis after Treatment Default in a High-Burden Setting: a Retrospective Cohort Study. PloS one. 2012;7(9):1-9.
8. Abbas A. Monitoring of Side Effects of Anti-Tuberculosis Drugs (ATD) on the Intensive Phase Treatment of Pulmonary TB Patients in Makassar. J. of Agromedicine and Medical Sciences. 2017;3(1);5-12.
9. Sinha K, Marak ITR, Singh WA. Adverse Drug Reactions in Tuberculosis Patients Due to Directly Observed Treatment Strategy Therapy: Experience at an Outpatient Clinic of a Teaching Hospital in the City of Imphal, Manipur, India. The J. of Association of Chest Physicians. 2013;1(2):50-53.
10. Kemenkes RI. National Guidelines for Tuberculosis Management in 2014 (Pedoman Nasional Penanggulangan Tuberkulosis 2014). Jakarta: Kemenkes RI; 2014.
11. Dinkes Prov. Sulawesi Selatan. Health Profile of South Sulawesi Province in 2016 (Profil Kesehatan Provinsi Sulawesi Selatan 2016). Makassar: Dinas Kesehatan Provinsi Sulawesi Selatan; 2016.
12. Wilkins N, Tsao B, Hertz M, Davis R, Klevens J. Connecting the Dots: An Overview of the links among multiple forms of violence. Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention Oakland. CA: Prevention Institute; 2014.
13. Mercy JA. Preventing Multiple Forms of Violence: A Strategic Vision for Connecting the Dots. Atlanta, GA: Division of Violence Prevention, National Center for Injury Prevention and Control. Centers for Disease Control and Prevention; 2016.
14. Rahmayuni. The Relationship between Self Motivation and Drinking Anti-Tuberculosis Medication (OAT) in Pulmonary TB Patients at Andalas Health Center, Padang (Hubungan Motivasi Diri dengan Kepatuhan Minum Obat Anti-Tuberculosis (OAT) pada Pasien TB Paru di Puskesmas Andalas Padang). Graduate Thesis. Padang: Universitas Andalas; 2016.
15. Dinkes Kab. Barru. Health Profile of Barru Regency in 2017 (Profil Dinas Kesehatan Kabupaten Barru 2017). Barru: Dinas Kesehatan kabupaten Barru; 2017.
16. Lestari S, Chairil. Factors Inhibiting and Improving Compliance with Anti-Tuberculosis (OAT) Drugs in Pulmonary TB Patients in Nusukan Health Center, Surakarta City (Faktor yang Menghambat dan Meningkatkan Kepatuhan Minum Obat Anti-

Tuberkulosis (OAT) pada penderita TBC Paru di Puskesmas Nusukan, Kota Surakarta). Motorik J. Ilmu Kesehatan. 2016;2(2):1-20.

17. Notoatmodjo S. Health Promotion and Behavioral Sciences (Promosi Kesehatan dan Ilmu Perilaku). Jakarta: Rineka Cipta; 2010.
18. Nanda GS, Singh H, Sharma B, Arora A. Adverse Reactions Due to Directly Observed Treatment Short Course Therapy: An Indian Prospective Study. IAIM. 2016;3(1):6-12.
19. Bhatia ML, Jain P, Ahmad M, Moghe VV, Khan ZY. Comparison of Outcomes of Two Antitubercular Regimens in Pulmonary Tuberculosis at Tertiary Care Hospital. Medical Science. 2013;3(2):275-277.
20. Jain SK, Lamichhane G, Nimmagadda S, Pomper MG, Bishai WR. Antibiotic Treatment of Tuberculosis: Old Problems, New Solutions with tuberculosis and Drug Resistance Surging. Y Microbe. 2008;3(6);7-14.
21. Arbex MA, Varella MDCL, Siqueira HRD, Mello FAFD. Antituberculosis Drugs: Drug Interactions, Adverse Effects, and Use in Special Situations. J. Bras. Pneumol. 2010;36(5): 25-37.
22. Syarifuddin M. Effectiveness, Strengths and Disadvantages of Anti Tuberculosis Lung medicine (Efektifitas, Kelebihan dan Kekurangan obat Anti Tuberkulosis Paru). Jakarta: Pusat Teknologi Intervensi Kesehatan Kementrian Kesehatan Republik Indonesia, 2013.
23. Lv Xiaozhen, et al. Adverse Reactions Due to Directly Observed Treatment Strategy Therapy in Chinese Tuberculosis Patients: A Prospective Study. PLoS ONE. 2013;8(6):65-37.
24. Abideen SP, Chandrasekaran K, Maheswa-ran U, Vijayakumar A, Kalaiselvan V, Mishra A, et al. Implementation of Self Reporting Pharmacovigilance in Anti Tubercular Therapy Using Knowledge Based Approach. J Pharmacovigilance. 2013;1(1):101-108.
25. Camila OJ, Hakim AR, Aizah T. Evaluation of the Use of Anti Tuberculosis Drugs in Adult Lung Tuberculosis Patients at the Outpatient Installation of the Klaten Lung Health Center (Evaluasi Penggunaan Obat Anti Tuberculosis pada Pasien Tuberculosis Paru Dewasa di Instalasi Rawat Jalan Balai Besar Kesehatan Paru Klaten). Graduate Thesis. Surakarta: Universitas Muhammadiyah Surakarta; 2013.
26. Sari ID, Yuniar Y, dan Syarifuddin M. Monitoring Study of Category 1 FDC Antituberculosis Drug Side Effects in Banten Province and West Java Province (Studi Monitoring Efek Samping Obat Antituberkulosis FDC Kategori 1 di Provinsi Banten dan Provinsi Jawa Barat). Media Litbangkes. 2014;24(1);28-35.
27. Clarasanti I, Wongkar MCP, Waleleng BJ. Description of the Enzyme Transaminase in Pulmonary Tuberculosis Patients Treated with Anti-tuberculosis Drugs at Prof. Dr. R. D. Kandou Hospital, Manado (Gambaran Enzim Transaminase pada Pasien Tuberkulosis Paru yang Diterapi dengan Obat-obat Anti-tuberkulosis di RSUP Prof. Dr. R. D. Kandou Manado). J. E-Clinic. 2016;4(1);14-23.

The Effects of Cold Compress and Warm Compress on β-Endorphin Levels, IL-6 and TNFα Among Adolescent with Dysmenorrhea

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ABSTRACT

Non-pharmacological efforts to treat dysmenorrhoea are include cold compresses and warm compresses. The aim of this study was to determine the differences effect of cold compresses and warm compresses to β-Endorphin levels, IL-6 and TNFα among adolescents with dysmenorrhoea. The research was Post Test Only with Control Group. β endorphin, IL-6 and TNFα were measured by ELISA, then analyzed by Independent Sample T-Test. The average β level of Endorphin in cold compress group was 143.03 pg/ml, in warm compress group was 171.43 pg/ml; the average IL6 level in cold compress group was 1352.60 pg/ml, in warm compress group was 961.14 pg/ml and the average TNFα level in cold compress group was 345.75 pg/ml, in warm compress group was 262.50 pg/ml. The results of Independent Sample T-Test showed that there was no difference in β levels of Endorphin IL-6 and TNFα in both of the warm and cold compresses group. Cold compress and warm compress can stimulate loose of Endorphin β levels and regulate uterine hypercontractility during menstrual pain. Cold compress and warm compress can be used as an alternative to treat dysmenorrhoea.

Keywords: *Cold compress, Warm compress, β-Endorphin levels, IL-6 levels, TNFα levels*

INTRODUCTION

Dysmenorrhoea is a painful sensation with cramps sensation in the lower abdomen, and commonly followed by sweating, tachycardia, headache, nausea, vomiting, diarrhea, and back pain before or during menstruation[1-3]. The intensity of menstrual pain was varies from mild, moderate and severe[4]. Severe of dysmenorrhea give affects physical, psychological and social consequences[5].

The prevalence of dysmenorrhoea in the world was varies from 37% to 90.1%, in China there were 37%[6], 55.5%-70% in adolescents and young adults in Turkey[7-8], 60.9% of female medical students in King Abdulaziz University[9], 74.4% in teenage girls in Ghana[10], 74%-86.1% in Iran, 77.6% among University of Gondar Students, Northwestern Ethiopia[11], 90.1% among Jordanian University students[12]. In Indonesia an estimated 55% of women in productive age were experienced menstrual pain[13]. In East Java, the number of reproductive young women aged 10-24 is 56,598 and about 11565 (1.31%) of those experienced dysmenorrhea and come to the obstetrics[14].

Factors that can increase the risk of dysmenorrhoea are include age and age of younger menarche, longer duration of menstruation, menstrual volume[15-17], low of BMI, smoking and alcoholism[16,18-19], low social support, family history of dysmenorrhoea, high caffeine consumsion[20], depression, anxiety and stress[7,21]. Primary dysmenorrhoea has a biochemical basis and doe to prostaglandin loose during menstruation. During the luteal and menstrual phases, prostaglandin F2-alpha (PGF2-α) were excretion. Excessive release of PGF2-α will increase the amplitude and frequency of uterine contractions and causes vasospasm of the uterine arterioles, causing lower abdominal ischemia

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and cramps[22] and back pain[23]. Psychiatric factors also play a role in the occurrence of primary dysmenorrhea. Stress can increase the levels of vasopressin and catecholamines and it will make vasoconstriction and ischemia in cells[24]. Peripheral blood analysis in women with dysmenorrhoea shows excessive synthesis and concentration of oxytocin, PGF2-a, vasopressin, IL-6 and TNF[25-28]. Dysmenorrhoea is a major cause of activities problem[29] such as absent from work or school[30-31] and decreased quality of life[8,32-33].

Pharmacological interventions for dysmenorrhoea use nonsteroidal anti-inflammatory drugs (NSAIDs) and oral contraceptive. The side effects including dependence[34-35], diarrhea, abdominal pain, nausea[36], kidney and liver complications, sleep disorders[37], digestive disorders[38]. The failure rate of pharmacological treatment is 20-25%[39]. Non-pharmacological interventions include cold and warm compress. Cold compress is ice therapy that can reduce prostaglandins which strengthens pain sensation and other subcutaneous at the injury place by inhibiting the inflammatory process. This is because cold compress can reduce blood flow to a part and reduce bleeding edema which is it cause analgesic effects by slowing the speed of nerve delivery so the pain impulses will less reach to the brain[40]. Warm compresses with hot jars cause conduction, where there is transfer of heat from the bladder into the body and it giving dilation for blood vessels and decreased muscle tension so that dysmenorrhoea pain will be reduced[41]. Skin stimulation causes the release of endorphins, thus blocking the transmission of pain stimuli[41]. The results of previous studies showed that Moxibustion can reduce the levels of PGF2α, oxytocin, vWF and increasing the levels of β-EP. The effect of cold and warm compress on β-Endorphin, IL-6 and TNFα has not been clearly known, so the researchers are interested to conducting the research about The Effects of Cold Compress and Warm Compress on β- Endorphin levels, IL-6 and TNFα among Adolescents with Dysmenorrhoea.

MATERIALS AND METHOD

The design of this research was Pretest-Postest. The population were all students at FIK-Unipdu Jombang who experienced dysmenorrhoea. Sample size was 40, selected by purposive sampling, then divided into cold compress group (n=20) and warm compress group (n=20). The instrument of data collection were thermometer, a hot jar and ice bag. Numeric Rating Scale used to measure pain level. ELISA inderect method to measure the levels of β Endorphin, IL-6 and TNFα using the. Data were analyzed by T-Test.

FINDINGS

The intensity of dysmenorrhoea before giving cold compress were mostly at moderate. However, in warm compresses group were more than half of participant at severe level. Intensity of dysmenorrhoea after giving treatment in cold compresses group were mostly at mild, while in warm compresses group were mostly at moderate level. Homogeneity of variances test results showed that the intensity of dysmenorrhoea before and after giving treatment in both of groups were not have a significant difference.

Table 1. The differences of β-Endorphin levels, IL-6 and TNFα after giving intervention

Variable	Cold compress Mean-(SD)	Warm compress Mean-(SD)	Mean Difference (95%-CI)	p
β-Endorphin	143.03(3.97)	171.43(2.59)	-28.40(-59.88=3.08)	0.074
IL-6	1352.60(3.57)	961.14(3.79)	39.46(-38.15-821.01)	0.070
TNFα	345.75(1.55)	262.50(6.14)	83.25(-42.85-209.35)	0.179

There were no have significant differences levels of β Endorphin, IL-6 and TNFα after giving treatment

β-endorphin levels after giving cold and warm compress had no significant differences. Cold and warm compress are the techniques for cutaneous stimulation. Cutaneous stimulation is skin stimulation carried out to relieve pain, works by encouraging the release of endorphins, so it will block the transmission of pain stimuli[41]. Changes in β-Endorphin levels can be explain on the basis of Opiate Endogenous theory, where opiate receptors in the brain and spinal cord were determine the central nervous system to activate morphine substances called endorphins and enkephalin when pain is received. This endogenous opiate can be stimulated by skin stimulation and muscles. These opioid receptors are located on peripheral sensory nerve extremity[42].

Cold compress was given by using an ice bag filled with ice, compressed to the abdominal area for 20 minutes and a warm compress was given by using a bag filled with warm water at a temperature of 40-45 C^{o} and compressed to the abdominal area for 20 minutes. The average β-endorphin level at cold compress group was 143.03 pg/ml, the warm compress group was 171.43 pg/ml. Giving cold and warm compresses can increase β-endorphin levels to relieve pain production. The higher of endorphins level make the level of pain at mild [43]. Endorphins inhibit fiber C in pre and post synapses and Aδ fibers in the dorsal horn and activate the larger of Aß (A-beta) sensory nerve fibers, thus blocking the pain signals when enter to spinal cord so the pain perception will decreases[44]. After intervention, the intensity of dysmenorrhea among respondents will decreased. This because of the release of β-endorphins levels that inhibit C fiber and activate Aß sensory nerve fibers so it will inhibits the pain signals to spinal cord and decreased perception of pain. The result was in accordance with previous studies which showed that β-endorphin levels in primary dysmenorrhoea increased after moxibustion therapy. Moxibustion therapy is a warm moxa stimulation at Guanyuan, Shenque and Sanyinjiao acupuncture points, the treatment giving for 10-15 minutes a day during 7 days before menstruation in 3 menstrual cycles[45].

IL-6 and TNFα levels had no difference. In primary dysmenorrhea, the level of genes expression of cytokine pro-inflammatory (IL1B, TNF, IL6 and IL8) at the first day of menstruation will significantly increases[28]. IL-6 functions to increase oxytocin secretion at the first day of menstruation[46], where TNFα functions to increase prostaglandin and oxytocin at the first day of menstruation[47-48]. Increased prostaglandins and oxytocin have an impact to excessive uterine contractions, decrease endometrial blood flow and cause pain during menstruation[28].

Cold compresses provide physiological effects to reduce the inflammatory response, blood flow and edema, local pain[49]. Heat will stimulates the vascular reaction by increasing blood flow, resulting in delusions of prostaglandins, bradykinin and histamine. Increasing blood flow also can increase oxygenation[39]. Local heat will give the abdomen to increasing gastrointestinal motility and relaxation to the uterus. Local heat is as effective as NSAIDs[50]. NSAIDs can reduce the accumulation of prostaglandins and reduce spasmodic contractions caused by prostaglandins and inhibit the activity of COX-2 and COX-1 enzymes[51].

The results of previous studies showed that the giving of warm stimuli (moxibution) can regulate uterine hypercontractility during menstrual pain by set of the mediator pain level serum where occur the decreasing levels of PGF2α serum and oxytocin[45]. The effect of moxibution treatment works like electroakupunctur[52]. Several studies have shown that electroacupuncture can reduce the expression of prostaglandin levels[53], peripheral blood lymphocytes among rat as the samples with primary dysmenorrhoea[54]. T-cells are the main source of cytokine secretion (TNF, Interleukin, interferons)[55]. Thus the cold compresses and warm compresses interventions can reduce pro-inflammatory cytokines IL-6 and TNFα.

CONCLUSION AND RECOMMENDATION

The results of this study showed that after giving warm and cold compresses in both group there were no differences in levels of β Endorphin, IL-6 and TNFα among adolescents with dysmenorrhoea. Cold compresses and warm compresses can be used as an alternative treatment to dysmenorrhoea.

Ethical Clearance: Ethics Committee of Nursing Faculty, Airlangga University

Conflict of Interest: No

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REFERENCES

1. Dawood MY. Primary Dysmenorrhea: Advances in Pathogenesis and Management. Obstet Gynecol. 2006. 108(2):428–441.
2. Kiran B, Sandozi T, Akila T, Chakraborty A, Meherban, Rani RJ. Study of the prevalence, severity and treatment of dysmenorrhea in medical and nursing students. International Journal of Pharma and Bio Sciences. 2012;3(1):161-170.
3. Mohamed EM. Epidemiology of dysmenorrhea among adolescent students. Life Science Journal. 2012;9(1):348–353.
4. Turk DC, Melzack R. Handbook of Pain Assessment.. New York: Guilford Publications;2011.
5. Deb S, Raine-Fenning N. Dysmenorrhoea. Obstet, Gynaecol Reprod Med. 2008;18:294–299.
6. Zhou H, Yang Z, Group S. Prevalence of Dysmenorrhea in Female Students in a Chinese University: a Prospective Study. Health. 2010;2(4):311–314.
7. Ozerdogan N, Sayiner D, Ayranci U. Prevalence and Predictors of Dysmenorrhea among Students at a University in Turkey. Int J Gynaecol Obstet. 2009;107(1):39–43.
8. Unsal A, Ayranci U, Tozun M. Prevalence of Dysmenorrhea and Its Effect on Quality of Life among a Group of Female University Students. *Ups J Med Sci.* 2010;115(2):138–45.
9. Ibrahim NK, Alghamdi MS, Al-Shaibani AN, Al-Amri FA, Alharbi HA, Al-Jadani AK, Alfaidi RA. Dysmenorrhea among female medical students in King Abdulaziz University: Prevalence, Predictors and outcome. Pak J Med Sci. 2015;31(6):1312-1317.
10. Gumanga S, Kwame A. Prevalence and Severity of Dysmenorrhea among some Adolescent Girls in a Secondary School iIn Accra, Ghana. Postgraduate Medical Journal of Ghana. 2012;1(1).
11. Gebeyehu MB, Mekuria AB, Tefera YG, Andarge DA, Debay YB, Bejiga GS & Gebresillassie BM. Prevalence, Impact, and Management Practice of Dysmenorrhea among University of Gondar Students, Northwestern Ethiopia: A Cross-Sectional Study. International Journal of Reproductive Medicine. 2017.
12. Mukattash TL, Tahaineh L, AlRawi N, Jarab A, Hammad H, Nuseir K. Behaviors and Attitudes towards Dysmenorrhea; a Crosssectional Survey of 2,000 Jordanian University Students. Jordan Medical Journal. 2013;47(1):26–34.
13. Proverawati. Menarche: Menstruasi Pertama Penuh Makna (Menarche: First menstruation is meaningfull). Nuha Medika. Yogyakarta;2009.
14. BPS-Prov-Jatim. Jawa Timur dalam Angka Tahun 2015 (East Java in score in 2015). Surabaya: BPS-Prov-Jatim;2015.
15. In Ae Jang, Ming YK, Sa Ra L, Kyung AJ, Hye WC. Factors related to dysmenorrhea among Vietnamese and Vietnamese marriage immigrant women in South Korea. Obstet Gynecol Sci.2013;56(4):242-248.
16. Latthe P, Mignini L, Gray R, Hills R, Khan K. Factors P;redisposing Women to Chronic Pelvic Pain: Systematic Review. *BMJ.* 2006;332(7544):749–55.
17. Muluneh AA, Nigussie TS, Gebreslasie KZ, Anteneh KT, Yohannes Z. Prevalence and Associated Factors of Dysmenorrhea among Secondary and Preparatory School Students in Debremarkos Town, North-West Ethiopia. BMC Women's Health.2018;*18:57.*
18. Perry M. Treatment Options for Dysmenorrhoea. Practice Nurs.2012;23:195–8.
19. Ju H, Jones M, Mishra GD. Smoking and Trajectories of Dysmenorrhoea among Young Australian Women. Tob Control.2016;25:195–202.
20. Faramarzi M, Salmalian H. Association of Psychologic and Nonpsychologic Factors with Primary Dysmenorrhea. Iran Red Crescent Med J. 2014;16(8):e16307.
21. Sahin N, Kasap B, Kirli U, Yeniceri N, Topal Y. Assessment of Anxiety-Depression Levels and Perceptions of Quality of Life in Adolescents with Dysmenorrhea. Reproductive Health.2018;*15:13:1-7.*
22. Lowdermilk, Perry, Cashion. Keperawatan Maternitas (Maternity Nursing). Elseiver;2013.
23. Varney. Buku Ajar Asuhan Kebidanan (Texbook of midwifery care). Jakarta:EGC; 2006.
24. Hillard PAJ. Dysmenorrhea. Pediatrics in Review.

2006;27:64-71.

25. Liedman R, Hansson SR, Howe D, Igidbashian S, McLeod A. Reproductive Hormones in Plasma Over The Menstrual Cycle in Primary Dysmenorrhea Compared With Healthy Subjects. Gynecol Endocrinol. 2008;24:508–513.
26. Akernlund M. Involvement of Oxytocin and Vasopressin in the Pathophysiology of Preterm Labor and Primary Dysmenorrhea. Prog Brain Res. 2002;139:359–365.
27. Yeh ML, Chen HH, So EC, Liu CF. A Study of Serum Malondialdehyde and Interleukin-6 Levels In Young Women With Dysmenorrhea In Taiwan. Life Sciences. 2004;75:669-673
28. Ma H, Hong M, Duan J, Liu P, Fan X, et al. Altered Cytokine Gene Expression in Peripheral Blood Monocytes across the Menstrual Cycle in Primary Dysmenorrhea: A Case-Control Study. PLoS ONE.2013;8(2):e55200.
29. Marjoribanks J, Ayeleke RO, Farquhar C and Proctor M. Nonsteroidal anti-inflammatory drugs for dysmenorrhoea. Cochrane Database Syst Rev.2010;20(1):CD001751.
30. Wong LP, Khoo EM. Dysmenorrhea in a Multiethnic Population of Adolescent Asian Girls. Int J Gynaecol Obstet.2010;108(2):139–42.
31. Sharma N, Sagayaraj M, Sujatha B. Menstrual characteristics and prevalence of dysmenorrhea in college students. International Journal of Scientifc and Research Publications.2014;4(10):1–6.
32. Ortiz MI. Primary Dysmenorrhea among Mexican University Students: Prevalence, Impact and Treatment. European Journal of Obstetrics & Gynecology and Reproductive Biology. 2010;152(1):73–7.
33. Gagua T, Tkeshelashvili B, Gagua D. Primary Dysmenorreahleading Problem of Adolescent Gynecology (review). Georgian Med News. 2012;207:7-14.
34. Gharloghi S, Torkzahrani S, Akbarzadeh AR, Heshmat R. The Effects of Acupressure on Severity of Primary Dysmenorrhea. Patient Prefer Adherence. 2012;6:137–42.
35. Chen MN, Chien LW, Liu CF. Acupuncture or Acupressure at the Sanyinjiao (SP6) Acupoint for theTreatment of Primary Dysmenorrhea: A meta-analysis. Evid Based Complement Alternat Med.2013:493038.
36. Kashefi F, Ziyadlou S, Khajehei M, Ashraf AR, Fadaee AR, Jafari P. Effect of Acupressure at the Sanyinjiao Point on Primary Dysmenorrhea: A Randomized Controlled Trial. Complement Ther Clin Pract. 2010;16:198–202.
37. Wang YJ, Hsu CC, Yeh ML, Lin JG. Auricular Acupressure to Improve Menstrual Pain and Menstrual Distress and Heart Rate Variability for Primary Dysmenorrhea in Youth with Stress. Evid Based Complement Alternat Med. 2013:138537.
38. Nasehi M, Sehhatie F, Zamanzadeh V, Delazar A, Javadzadeh Y, Chongheralu BM. Comparison of the Effectiveness of Combination of Fennel Extract/ Vitamin E with Ibuprofen on the Pain Intensity in Students with Primary Dysmenorrhea. Iran J Nurs Midwifery Res.2013;18:355–9.
39. Navvabi Rigi et al. Comparing The Analgesic Effect of Heat Patch Containing Iron Chip and Ibuprofen for Primary Dysmenorrhea: A Randomized Controlled Trial. Biomed Central.2012.
40. Price AS, Wilson ML. Patofisiologi: Konsep Klinis Proses-Proses Poenyakit (clinical concept of disease process). Jakarta: EGC; 2005.
41. Potter & Perry. Buku Ajar Fundamental Keperawatan (Textbook of fundamental of nursing) Jakarta:EGC;2010.
42. Rahayu D, Yunarsih. The transformation of **β** Endorphyn level among primigravia inpartu 1st level of active phase by using Comfort Food: Slow-Stroke Back Massage based on comfortable Kolcaba Theory in government hospital, Kediri. The Indonesian Journal of Helath Science. 2016;7(1):17-25.
43. Smeltzer SC, Bare BG. Textbook of Medical Surgical Nursing. Philadelphia: Lippincot Williams & Wilkins; 2009.
44. Londhey VA. Pathophysiology of Pain. Suplement to Journal of The Association of Physicians of India. 2015.
45. Yang M, Chen X, Bo L, Lao L, Chen J, Yu S, Yu Z, Tang H, Yi L, Wu X, Yang J, Liang F. Moxibustion for Pain Relief in Patients With Primary Dysmenorrhea: A Randomized Controlled Trial. PLOS ONE. 2015;1-17.

46. Rauk PN, Friebe-Hoffmann U, Winebrenner LD, Chiao JP. Interleukin-6 Up-Regulates the Oxytocin Receptor in Cultured Uterine Smooth Muscle Cells. Am J Reprod Immunol. 2015;45:148–153.

47. Skarzynski DJ, Miyamoto Y, Okuda K. Production of Prostaglandin F(2alpha) by Cultured Bovine Endometrial Cells in Response to Tumor Necrosis Factor Alpha: Cell Type Specificity and Intracellular Mechanisms. Biol Reprod . 2000;62:1116–1120.

48. Thompson M, Barata da Silva H, Zielinska W, White TA, Bailey JP. TNF-α-mediated Augmentation of Agonist-Induced Ca2+ Transients in Myometrial Cells. Am J Physiol Endocrinol Metab. 2004;287:E1142–1148.

49. Tamsuri. Konsep dan Penatalaksanaan Nyeri (Concept and treatment for pain). Jakarta: EGC; 2004.

50. Akin MD, Weingand KW, Hengehold DA, Goodale MB, Hinkle RT, Smith RP. Continuous low level topical heat in the treatment of dysmenorrhea. Obstet Gynecol. 2001;97:343–349.

51. Sahin I, Saracoglu F, Kurban Y, Turkkani B. Dysmenorrhea Treatment with a Single Daily Dose of Rofecoxib. International Journal of Gynecology and Obstetrics. 2003;83(3):285–291.

52. Lee I-S, Wallraven C, Kong J, Chang D-S, Lee H, Park H-J. When Pain is Not Only Pain: Inserting Needles into the Body Evokes Distinct Reward-Related Brain Responses in the Context Of A Treatment. Physiology & behavior. 2015;140:148–55.

53. Zhang HZ, Shan SL, Zhong-Xin WU, Wei XM. Effect of Electroacupuncture on SP and PGF2 in Serum of Dysmenorrhea Rats. *Journal of Nanjing University of Traditional Chinese Medicine.* 2014.

54. Ling-Yu LI, Yan P, Jin XF. Efect of Acupuncture at Zhibian Point on T Lymphocyte Subsets of Primary Dysmenorrhea Model Rats. Journal of Clinical Acupuncture Moxibustion. 2016.

55. Totsch SK, Sorge RE. Immune System Involvement In Specific Pain Conditions. Molecular Pain. 2017;13:1–17.

Mediating Effects of Wisdom in the relation between Lifestyle Habits (LH) and Health Conservation (HC) of Middle-aged Men

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ABSTRACT

Purpose: The purpose of this study was to identify the mediating effect of wisdom in relation between LH and HC of middle-aged men. **Methods:** The design of this study was secondary analysis research using the data of Kim's research. Subjects in the primary study were 134 middle-aged men residing in C and M city. Data were analyzed using descriptive statistics, Pearson's correlation coefficients, and multiple regression analysis. **Results:** There were statistically significant relationship between HC and the following independent variables: LH (r=.30, p=.001) and wisdom (r=.71, p<.001). Wisdom affected relation between lifestyles habits and HC of middle-aged men as a complete mediation effect variable, and the variable's explanation power was 50.3%. LH, which is independent variables, are not directly effective in HC. It works only through the mediating variable of wisdom. It was confirmed that in relation between LH and HC, wisdom was a significant mediating variable (Z=6.40, p<.001). **Conclusion**: This study showed that wisdom has a mediating effect. LH was not directly effective in preserving health, but only through wisdom. Wisdom has a complete mediation effect on the HC of middle-aged men. Therefore, in order for middle-aged men to preserve their health, nursing intervention is needed to make LH right and to increase wisdom.

Keywords: *Mediating effect, Middle-aged men, Health conservation, Lifestyle habits, Wisdom.*

INTRODUCTION

Health conservation (HC) is the act of maintaining a state of balance and well-being as a being that has physical, mental and psychological capacities.[1] When HC is achieved, the individual can achieve harmony and adjustment from the perspective of uniformity and integration. As such, health needs to be well preserved in order to improve the quality of life as one adjusts to life. However, middle-aged men in Korea experience a higher rate of sudden death compared to those in other age groups and are at risk to their health due to an unhealthy lifestyle, a heavy burden of responsibility at home and work, and excessive stress, lack of rest or exercise. A study conducted on middle-aged men to identify the factors affecting HC showed that the variables of stress, life style habits, self-concept, self-efficacy and wisdom are correlated with HC, with wisdom in particular being an important factor affecting HC.[2] Wisdom has already been identified as an important factor that improves the quality of life or preserves health in middle-aged adults, women or the elderly.[3~6] Throughout life, wisdom serves as a function that includes the understanding of the principles of things, the good and bad, judgment, interpersonal skills and a thorough grasp of life. As such, it is often considered as a key to successful human development.[6] In addition, wisdom is associated with health habits. The elderly with wisdom did not smoke or drink alcohol, had a high satisfaction with sleep and practiced appropriate exercise.[7] But studies that reviewed the effect of life style habits and wisdom on HC in middle-aged men are rare, and this is especially the case for studies that reviewed the mediating effects of wisdom.

As there is a need for nurses to provide nursing that can help middle-aged men promote health, prevent illness and preserve health throughout the course of their daily life[3], this researcher plans to analyze the mediating

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effects of wisdom in the association between daily life style habits and HC of middle-aged men, using the data from the primary study conducted by Kim[8], and thus provide a basic set of data for the development of an intervention program on wisdom.

MATERIALS AND METHOD

Research design

This study is a secondary analysis research conducted to identify mediating effect of wisdom in relation between LH and HC of middle-aged men using data of Kim's research.[8]

Subjects

The data on the subjects of the primary study were used. The subjects of primary study data[8] were convenience extraction of middle-aged men who live or work in Gyeongbuk C and M cities. It was approved by the K University Institutional Research Board. The sample size was 134 people.

Instruments

The instruments used in the primary study[8] were as follows.

LH

LH instrument which was an adaptation by Ro[9] from the health promotion behavior evaluation index by Wilson and Ciliska[10] was used. It was composed of a total of 25 questions. It was composed of a Likert five-point scale from 1 to 5 and higher points represent healthier LH. At the time of development, also in the research by Wilson and Ciliska,[10] reliability Cronbach's α was .88. In this study, reliability was .74.

Wisdom

To measure the wisdom of middle-aged men, this study measured it with the 'wisdom scale of Korean elderly people' developed by Sung, Lee and Park.[11] The tool was consisted of a total of 27 questions. The scale ranged from 1 point of 'very unlikely' to 4 points of 'very likely'. A higher score indicates that the degree of wisdom perceived by the middle-aged men were higher. Cronbach's α was .80 at the time of the development of tool. In this study, it was .90.

HC

HC is a physically, mentally, socially and psychologically integrated object that maintains the balance. [12] To measure the HC of elderly people, this study measured it with the HC scale developed by Sung[1]. This tool was consisted of a total of 37 questions Each question was based on a 4-point scale. The scale ranged from 1 point of 'very unlikely' to 4 points of 'very likely.' A higher score indicates that the degree of HC was higher. Cronbach's α was .94 at the time of the development of tool. In this study, it was .85.

Data collection

The data collection in the primary study[8] was as follows.

The data for the primary study were collected from May to June in 2018. We visited the parks and sports facilities located in C and M city in Gyeongbuk to explain the purpose of the research to the people who met the standards of the targets of the survey and received written agreement from them. After that, we distributed the structured questionnaires and had the respondents fill them out on their own.

Ethical Consideration

This study obtained an approval from the IRB of K University on the content and methodology (IRB No. KNU_IRB_2018-64).

Data analysis

Data were analyzed using IBM SPSS Statistics 23 program as follows. The general characteristics of the subject were analyzed with frequency and percentage. HC and related variables of the subjects were analyzed with descriptive statistics. The correlation among the wisdom, LH and HC was analyzed with Pearson's correlation coefficient. To identify the mediating effect of wisdom in relation between LH and HC of the subject, the multiple regression analysis was used.

FINDINGS

The General Characteristics of Subjects

In the primary research, the general characteristics of the subjects were shown in Table 1.

The subjects participated in this study were 134 and the person of 50-59 years old were 82 persons (61.2%), the persons of under 49 years old or over 60 years were 52 persons and the average age was 52.17(5.22) years old. The education level of the subjects was 70 (52.2%)

in the case of having a university or higher education level. Most had jobs, and 89 people (66.4%) exercised regularly. The number of respondents who answered that the economic status was bad was 89 (66.4%).

Table 1: The General Characteristics of the Subjects (N=134)

Variables	Categories	N (%)
Age	Under 49 years	40(29.9)
	50~59	82(61.2)
	Over 60 years	12(9.0)
Educational level	Below primary school graduate	2(1.5)
	Middle-High School graduate	62(46.3)
	College graduate or higher	70(52.2)
Job	Yes	123(91.79)
	No	11(8.21)
Regular exercise	Regular	89(66.4)
	None	45(33.6)
Economic status	Good	45(33.6)
	Bad	89(66.4)

Degree of LH, Wisdom and HC of Subjects

In the primary paper, degree of LH, wisdom and HC of subjects were as shown in Table 2. LH was 3.49 out of 5 points. Wisdom was 3.00 out of 4 points. HC was 2.78 out of 4 points.

Table 2: Degree of LH, Wisdom and HC of Subjects (N=134)

Variables	Possible range	M(SD)
LH	1-5	3.49 (0.39)
Wisdom	1-4	3.00 (0.28)
HC	1-4	2.78 (0.25)

Correlation of LH, Wisdom and HC of Subjects

The correlation of lifestyles habit, wisdom and degree of HC of subjects was as shown in Table 3.

HC in middle-aged men, LH (r=.30, p=.001), and wisdom (r=.71, p<.001) were statistically relevant at a significant level. Wisdom and LH were statistically relevant at significant level (r=.42, p= .001). The better the LH, the higher the wisdom, the higher the HC of them.

Table 3: Correlation of LH, Wisdom and HC of Subjects (N=134)

Variables	LH r(p)	Wisdom r(p)	HC r(p)
LH	1		
Wisdom	.42 (.001)	1	
HC	.30 (.001)	.71 (<.001)	1

Mediating effects of wisdom in the relation between LH and HC

To find the mediating variable of wisdom in the process of LH of subject affecting HC, the study used 3-step regression equation. Before confirming the mediating effect of wisdom, the assumption of regression analysis was confirmed, and the Durbin-Watson index regarding autocorrelation was 1.570~1.838, which indicated no autocorrelation of outlier. As for the

multicollinearity among independent variables, the VIF index was 1.00~1.216 which is less than 10, confirming no multicollinearity, indicating this data was appropriate for regression analysis.

At first step regression analysis, LH, the independent variable significantly affected wisdom, the mediating variable (p<.001). Thus, this study suggests mediating effect of wisdom in relation between LH and HC. According to first step regression analysis, LH, the independent variable significantly affected wisdom, the mediating variable (β=.42, p<.001), the explanation power of wisdom was 17.1%. At second step regression analysis, the independent variable significantly affected LH, the mediating variable (β=.30, p=.001), and explanation power of HC was 8.0%. To verify the influence of wisdom, the mediating variable to HC, the independent variable in third step, the study conducted regression analysis with LH and wisdom as predictor and HC as dependent variable, it was confirmed that the LH (β=-.007 p=.916) and wisdom (β=.72, p<.001) were significant predictors of HC.

In other words, the direct influence of LH of middle-aged men to HC was β=-.007. And multiplication of influence of LH to wisdom (β=.42) and influence of wisdom to HC (β=.72), the value 0.302 refers to indirect influence of LH to HC via wisdom. At this point, β value -.007 of LH, the independent variable which is the direct influence was fewer than entire influence β value (.30) of first step, indicating the mediating effect of wisdom. Thus, wisdom affected relation between lifestyles habits and HC of middle-aged men as a complete mediation effect variable, and the variable's explanation power was 50.3%. LH, which are independent variables, are not directly effective in HC. It works only through the mediating variable of wisdom. For significance verification regarding the size of mediating effect of wisdom, the study conducted Sobel test. As the result, it was confirmed that in relation between LH and HC, wisdom was a significant mediating variable (Z=6.40, p<.001). [Table 4]

Table 4: Mediating effects of Wisdom in the relation between LH and HC

Step	Variables	B	β	t	*p*	Adj. R^2	F	*p*
Step 1	Lifestyle habits →Wisdom	.30	.42	5.34	<.001	.171	28.47	<.001
Step 2	Lifestyle habits → Health conservation	.18	.30	3.55	.001	.080	12.60	.001
Step 3	Lifestyle habits, Wisdom → Health conservation					.503	68.32	<.001
	Lifestyle habits → Health conservation	-.004	-.007	-.11	.916			
	Wisdom → Health conservation	.63	.72	10.65	<.001			
Sobel test : Z=6.40, p<.001								

DISCUSSION

The purpose of this study was to analyze the mediating effects of wisdom in the relation between LH and HC of middle-aged men, and to find an integrated nursing approach to preserve the healthy life of them. First, in the association between life style habits, wisdom and health, HC had a positive correlation with life style habits and with wisdom, indicating that those with better life style habits and greater wisdom were more likely to preserve health well. Life style habits include diet,

weight management, smoking, caffeine and alcohol intake, safety awareness, sleep, stress management, character management, anxiety, depression management, satisfaction and relationships with family or friends. [9] When these aspects of life style habits are well managed, health and quality of life can be improved. Middle-aged adults who exercise also had a higher quality of life [13] This is similar to the study that showed that the elderly who are wise can achieve successful aging [7] and that wisdom is an important preceding factor for successful aging [14]. In addition, successful aging has the same meaning as lack of disease or disorder, maintenance of physical and cognitive function, and proactive participation in life [15] and is a similar concept to HC. According to the principles of preservation by Levine, human beings must achieve an integration of structural, personal, social energies and can preserve health while maintaining uniformity and integration.[16] As such, it is recommended that an iteration of this study be conducted by adopting the concept of life style habits and wisdom for HC of middle-aged men.

Wisdom includes the positive elements of self-preservation, completion, judgment, interpersonal skills and understanding of life, and allows for an integrated and comprehensive approach to life's challenges and issues. Such elements require life experience as an important element and take time to develop [6] , which means it is likely to increase as one ages. The scales for wisdom developed to best fit Korean culture consist of items on empathy, self-reflection and overcoming life's challenges. While these tools were developed for the elderly, but it was confirmed that the items are key concepts associated with health in middle-aged men, too.[17] In Eastern philosophy, meditation and observation of wise people or teachers are ways to improve one's own wisdom.[18] As such, it is appropriate to use wisdom as a variable to measure whether middle-aged men maintain their life with wisdom and manage their mental and social health. Wisdom had a mediating effect in the association between the health status and HC of the elderly[19] as well as in the association between health improvement behaviors and HC of middle-aged adults.[20] As wisdom has an important mediating effect on the association between health status, health improvement behaviors, daily life style habits and HC in men and women in their middle ages and in their advanced years, a program related to a wise life that takes into account aspects of Korean culture must be developed to encourage them to lead a wise life.

CONCLUSION

In this study, HC of middle-aged men had a positive correlation with life style habits and with wisdom. In addition, wisdom was found to have a complete mediating effect in the association between life style habits and HC in middle-aged men. Therefore, in order to encourage middle-aged men to take more interest in health and develop a healthy habit in daily life, local communities and healthcare experts such as nurses must develop and apply a program for healthy life style habits. This researcher hopes that continued studies on middle-aged men will be conducted using wisdom and HC as concepts.

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REFERENCES

1. Sung KW. Scale development on health conservation of the institutionalized elderly. Journal of Korean Academy of Nursing. 2005;35(1):113-124.
2. Kim HK. Mediating effect of wisdom on the relationship between health promoting behavior and Health conservation among the Korean middle-aged adults. International Journal of Applied Engineering Research. 2016;11(6):3923-29.
3. Kim HK. The influencing factors on Health conservation of middle-aged adults. International Journal of Applied Engineering Research. 2015;10(23):43538-544.
4. Kim HK. Health conservation in community-dwelling older Korean adults: Association of pain, perceived health status, social networks, self-efficacy, and wisdom. Advanced in Information Sciences and Service sciences, 2015;7(1):26-38.
5. Sung KW. Pain, wisdom and Health conservation in older adults with chronic diseases. Journal of Korean Gerontological Nursing. 2014;16(1):85-93.

6. Ardelt M. Antecedents and effects of wisdom in old age: A longitudinal perspective on aging well. Research on Aging. 2000; 22(4):360-394.
7. Sung KW. Relation of successful aging and wisdom in Korean older adults. Journal of Korean Gerontologycal Nursing. 2011;13(1):48-57.
8. Kim HK. Factors influencing Health conservation of middle-aged men in Korea. Indian Journal of Public Health & Development. 2018;9(10):425-431.
9. Ro TY. A study on determinants of health promoting behavior in a general hospital nurses. Department of Landscape Architecture Graduate School. Seoul National University; 1997.
10. Wilson MC, Ciliska D. Life style development and use of the fantastic checklist. Canadian Family Physician. 1984;30(6):1527-30.
11. Sung KW. Lee SY, Park JH. Scale development of wisdom among Korean elderly. Journal of the Korean Gerontological Society. 2010;30(1):65-80.
12. Levine ME. The conservation model: Twenty years later. In J P. Riehl-Sisca (*Ed.*), Conceptual models for nursing practice (325-337). Norwalk. CT; Appleton & Lange. 1989.
13. Choi WH. The relationship of depression, fatigue and quality of life in middle-aged adults. The Korean Journal of Health Service Management, 2012; 6(2): 91-99.
14. Ardelt M. Wisdom and life satisfaction in old age. Journal if Gerontology. 1997; 52:15-27.
15. Levine ME. Adaptation and assessment: A rationale for nursing intervention. The American Journal of Nursing,1966;66(11):2450-53.
16. Rowe JW, Kahn RL. Successful aging. 1998. New York: Pantheon Books.
17. Sung KW, Lee SY, Park JH. Scale development of wisdom among Korean elderly. Journal of the Korean Gerontological Society. 2010;30(1):65-80.
18. Kim KH. Mindfulness, self-regulation, and wisdom. Korean Journal of Health Psychology. 2008;13(2):285-306.
19. Kim HK. The mediating effect of wisdom on the relationship between perceived health status and Health conservation among the Korean elderly. Journal of Convergence Information Technology. 2015;10(2):78-88.
20. Kim HK. Mediating effect of wisdom on the relationship between health promoting behavior and Health conservation among the Korean middle-aged adults. International Journal of Applied Engineering Research. 2016;11(6):3923-3929.

The Effects of Cold Compress and Warm Compress on β-Endorphin Levels, IL-6 and TNFα among Adolescent with Dysmenorrhea

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ABSTRACT

Non-pharmacological efforts to treat dysmenorrhoea are include cold compresses and warm compresses. The aim of this study was to determine the differences effect of cold compresses and warm compresses to β-Endorphin levels, IL-6 and TNFα among adolescents with dysmenorrhoea. The research was Post Test Only with Control Group. β endorphin, IL-6 and TNFα were measured by ELISA, then analyzed by Independent Sample T-Test. The average β level of Endorphin in cold compress group was 143.03 pg/ml, in warm compress group was 171.43 pg/ml; the average IL6 level in cold compress group was 1352.60 pg/ml, in warm compress group was 961.14 pg/ml and the average TNFα level in cold compress group was 345.75 pg/ml, in warm compress group was 262.50 pg/ml. The results of Independent Sample T-Test showed that there was no difference in β levels of Endorphin IL-6 and TNFα in both of the warm and cold compresses group. Cold compress and warm compress can stimulate loose of Endorphin β levels and regulate uterine hypercontractility during menstrual pain. Cold compress and warm compress can be used as an alternative to treat dysmenorrhoea.

Keywords: *Cold compress, Warm compress, β-Endorphin levels, IL-6 levels, TNFα levels*

INTRODUCTION

Dysmenorrhoea is a painful sensation with cramps sensation in the lower abdomen, and commonly followed by sweating, tachycardia, headache, nausea, vomiting, diarrhea, and back pain before or during menstruation[1-3]. The intensity of menstrual pain was varies from mild, moderate and severe[4]. Severe of dysmenorrhea give affects physical, psychological and social consequences[5].

The prevalence of dysmenorrhoea in the world was varies from 37% to 90.1%, in China there were 37%[6], 55.5%-70% in adolescents and young adults in Turkey[7-8], 60.9% of female medical students in King Abdulaziz University[9], 74.4% in teenage girls in Ghana[10], 74%-86.1% in Iran, 77.6% among University of Gondar Students, Northwestern Ethiopia[11], 90.1% among Jordanian University students[12]. In Indonesia an estimated 55% of women in productive age were experienced menstrual pain[13]. In East Java, the number of reproductive young women aged 10-24 is 56,598 and about 11565 (1.31%) of those experienced dysmenorrhea and come to the obstetrics[14].

Factors that can increase the risk of dysmenorrhoea are include age and age of younger menarche, longer duration of menstruation, menstrual volume[15-17], low of BMI, smoking and alcoholism[16,18-19], low social support, family history of dysmenorrhoea, high caffeine consumsion[20], depression, anxiety and stress[7,21]. Primary dysmenorrhoea has a biochemical basis and doe to prostaglandin loose during menstruation. During the luteal and menstrual phases, prostaglandin F2-alpha (PGF2-α) were excretion. Excessive release of PGF2-α will increase the amplitude and frequency of uterine contractions and causes vasospasm of the uterine arterioles, causing lower abdominal ischemia and cramps[22] and back pain[23]. Psychiatric factors also

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play a role in the occurrence of primary dysmenorrhea. Stress can increase the levels of vasopressin and catecholamines and it will make vasoconstriction and ischemia in cells[24]. Peripheral blood analysis in women with dysmenorrhoea shows excessive synthesis and concentration of oxytocin, PGF2-a, vasopressin, IL-6 and TNF[25-28]. Dysmenorrhoea is a major cause of activities problem[29] such as absent from work or school[30-31] and decreased quality of life[8,32-33].

Pharmacological interventions for dysmenorrhoea use nonsteroidal anti-inflammatory drugs (NSAIDs) and oral contraceptive. The side effects including dependence[34-35], diarrhea, abdominal pain, nausea[36], kidney and liver complications, sleep disorders[37], digestive disorders[38]. The failure rate of pharmacological treatment is 20-25%[39]. Non-pharmacological interventions include cold and warm compress. Cold compress is ice therapy that can reduce prostaglandins which strengthens pain sensation and other subcutaneous at the injury place by inhibiting the inflammatory process. This is because cold compress can reduce blood flow to a part and reduce bleeding edema which is it cause analgesic effects by slowing the speed of nerve delivery so the pain impulses will less reach to the brain[40]. Warm compresses with hot jars cause conduction, where there is transfer of heat from the bladder into the body and it giving dilation for blood vessels and decreased muscle tension so that dysmenorrhoea pain will be reduced[41]. Skin stimulation causes the release of endorphins, thus blocking the transmission of pain stimuli[41]. The results of previous studies showed that Moxibustion can reduce the levels of PGF2α, oxytocin, vWF and increasing the levels of β-EP. The effect of cold and warm compress on β-Endorphin, IL-6 and TNFα has not been clearly known, so the researchers are interested to conducting the research about The Effects of Cold Compress and Warm Compress on β- Endorphin levels, IL-6 and TNFα among Adolescents with Dysmenorrhoea.

MATERIALS AND METHOD

The design of this research was Pretest-Postest. The population were all students at FIK-Unipdu Jombang who experienced dysmenorrhoea. Sample size was 40, selected by purposive sampling, then divided into cold compress group (n=20) and warm compress group (n=20). The instrument of data collection were thermometer, a hot jar and ice bag. Numeric Rating Scale used to measure pain level. ELISA inderect method to measure the levels of β Endorphin, IL-6 and TNFα using the. Data were analyzed by T-Test.

FINDINGS

The intensity of dysmenorrhoea before giving cold compress were mostly at moderate. However, in warm compresses group were more than half of participant at severe level. Intensity of dysmenorrhoea after giving treatment in cold compresses group were mostly at mild, while in warm compresses group were mostly at moderate level. Homogeneity of variances test results showed that the intensity of dysmenorrhoea before and after giving treatment in both of groups were not have a significant difference.

Table 1. The differences of β-Endorphin levels, IL-6 and TNFα after giving intervention

Variable	Cold compress Mean-(SD)	Warm compress Mean-(SD)	Mean Difference (95%-CI)	p
β-Endorphin	143.03(3.97)	171.43(2.59)	-28.40(-59.88=3.08)	0.074
IL-6	1352.60(3.57)	961.14(3.79)	39.46(-38.15-821.01)	0.070
TNFα	345.75(1.55)	262.50(6.14)	83.25(-42.85-209.35)	0.179

There were no have significant differences levels of β Endorphin, IL-6 and TNFα after giving treatment

β-endorphin levels after giving cold and warm compress had no significant differences. Cold and warm compress are the techniques for cutaneous stimulation. Cutaneous stimulation is skin stimulation carried out to relieve pain, works by encouraging the release of endorphins, so it will block the transmission of pain stimuli[41]. Changes in β-Endorphin levels can be explain on the basis of Opiate Endogenous theory, where opiate receptors in the brain and spinal cord were determine the

central nervous system to activate morphine substances called endorphins and enkephalin when pain is received. This endogenous opiate can be stimulated by skin stimulation and muscles. These opioid receptors are located on peripheral sensory nerve extremity[42].

Cold compress was given by using an ice bag filled with ice, compressed to the abdominal area for 20 minutes and a warm compress was given by using a bag filled with warm water at a temperature of 40-45 C^{o} and compressed to the abdominal area for 20 minutes. The average β-endorphin level at cold compress group was 143.03 pg/ml, the warm compress group was 171.43 pg/ml. Giving cold and warm compresses can increase β-endorphin levels to relieve pain production. The higher of endorphins level make the level of pain at mild [43]. Endorphins inhibit fiber C in pre and post synapses and Aδ fibers in the dorsal horn and activate the larger of Aß (A-beta) sensory nerve fibers, thus blocking the pain signals when enter to spinal cord so the pain perception will decreases[44]. After intervention, the intensity of dysmenorrhea among respondents will decreased. This because of the release of β-endorphins levels that inhibit C fiber and activate Aß sensory nerve fibers so it will inhibits the pain signals to spinal cord and decreased perception of pain. The result was in accordance with previous studies which showed that β-endorphin levels in primary dysmenorrhoea increased after moxibustion therapy. Moxibustion therapy is a warm moxa stimulation at Guanyuan, Shenque and Sanyinjiao acupuncture points, the treatment giving for 10-15 minutes a day during 7 days before menstruation in 3 menstrual cycles[45].

IL-6 and TNFα levels had no difference. In primary dysmenorrhea, the level of genes expression of cytokine pro-inflammatory (IL1B, TNF, IL6 and IL8) at the first day of menstruation will significantly increases[28]. IL-6 functions to increase oxytocin secretion at the first day of menstruation[46], where TNFα functions to increase prostaglandin and oxytocin at the first day of menstruation[47-48]. Increased prostaglandins and oxytocin have an impact to excessive uterine contractions, decrease endometrial blood flow and cause pain during menstruation[28].

Cold compresses provide physiological effects to reduce the inflammatory response, blood flow and edema, local pain[49]. Heat will stimulates the vascular reaction by increasing blood flow, resulting in delusions of prostaglandins, bradykinin and histamine. Increasing blood flow also can increase oxygenation[39]. Local heat will give the abdomen to increasing gastrointestinal motility and relaxation to the uterus. Local heat is as effective as NSAIDs[50]. NSAIDs can reduce the accumulation of prostaglandins and reduce spasmodic contractions caused by prostaglandins and inhibit the activity of COX-2 and COX-1 enzymes[51].

The results of previous studies showed that the giving of warm stimuli (moxibution) can regulate uterine hypercontractility during menstrual pain by set of the mediator pain level serum where occur the decreasing levels of PGF2α serum and oxytocin[45]. The effect of moxibution treatment works like electroakupunctur[52]. Several studies have shown that electroacupuncture can reduce the expression of prostaglandin levels[53], peripheral blood lymphocytes among rat as the samples with primary dysmenorrhoea[54]. T-cells are the main source of cytokine secretion (TNF, Interleukin, interferons)[55]. Thus the cold compresses and warm compresses interventions can reduce pro-inflammatory cytokines IL-6 and TNFα.

CONCLUSION AND RECOMMENDATION

The results of this study showed that after giving warm and cold compresses in both group there were no differences in levels of β Endorphin, IL-6 and TNFα among adolescents with dysmenorrhoea. Cold compresses and warm compresses can be used as an alternative treatment to dysmenorrhoea.

Ethical Clearance: Ethics Committee of Nursing Faculty, Airlangga University

Conflict of Interest: No

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REFERENCES

1. Dawood MY. Primary Dysmenorrhea: Advances in Pathogenesis and Management. Obstet Gynecol. 2006. 108(2):428–441.
2. Kiran B, Sandozi T, Akila T, Chakraborty A, Meherban, Rani RJ. Study of the prevalence, severity and treatment of dysmenorrhea in medical and nursing students. International Journal of Pharma and Bio Sciences. 2012;3(1):161-170.

3. Mohamed EM. Epidemiology of dysmenorrhea among adolescent students. Life Science Journal. 2012;9(1):348–353.
4. Turk DC, Melzack R. Handbook of Pain Assessment.. New York: Guilford Publications;2011.
5. Deb S, Raine-Fenning N. Dysmenorrhoea. Obstet, Gynaecol Reprod Med. 2008;18:294–299.
6. Zhou H, Yang Z, Group S. Prevalence of Dysmenorrhea in Female Students in a Chinese University: a Prospective Study. Health. 2010;2(4):311–314.
7. Ozerdogan N, Sayiner D, Ayranci U. Prevalence and Predictors of Dysmenorrhea among Students at a University in Turkey. Int J Gynaecol Obstet. 2009;107(1):39–43.
8. Unsal A, Ayranci U, Tozun M. Prevalence of Dysmenorrhea and Its Effect on Quality of Life among a Group of Female University Students. *Ups J Med Sci.* 2010;115(2):138–45.
9. Ibrahim NK, Alghamdi MS, Al-Shaibani AN, Al-Amri FA, Alharbi HA, Al-Jadani AK, Alfaidi RA. Dysmenorrhea among female medical students in King Abdulaziz University: Prevalence, Predictors and outcome. Pak J Med Sci. 2015;31(6):1312-1317.
10. Gumanga S, Kwame A. Prevalence and Severity of Dysmenorrhea among some Adolescent Girls in a Secondary School iIn Accra, Ghana. Postgraduate Medical Journal of Ghana. 2012;1(1).
11. Gebeyehu MB, Mekuria AB, Tefera YG, Andarge DA, Debay YB, Bejiga GS & Gebresillassie BM. Prevalence, Impact, and Management Practice of Dysmenorrhea among University of Gondar Students, Northwestern Ethiopia: A Cross-Sectional Study. International Journal of Reproductive Medicine. 2017.
12. Mukattash TL, Tahaineh L, AlRawi N, Jarab A, Hammad H, Nuseir K. Behaviors and Attitudes towards Dysmenorrhea; a Crosssectional Survey of 2,000 Jordanian University Students. Jordan Medical Journal. 2013;47(1):26–34.
13. Proverawati. Menarche: Menstruasi Pertama Penuh Makna (Menarche: First menstruation is meaningfull). Nuha Medika. Yogyakarta;2009.
14. BPS-Prov-Jatim. Jawa Timur dalam Angka Tahun 2015 (East Java in score in 2015). Surabaya: BPS-Prov-Jatim;2015.
15. In Ae Jang, Ming YK, Sa Ra L, Kyung AJ, Hye WC. Factors related to dysmenorrhea among Vietnamese and Vietnamese marriage immigrant women in South Korea. Obstet Gynecol Sci.2013;56(4):242-248.
16. Latthe P, Mignini L, Gray R, Hills R, Khan K. Factors P;redisposing Women to Chronic Pelvic Pain: Systematic Review. *BMJ.* 2006;332(7544):749–55.
17. Muluneh AA, Nigussie TS, Gebreslasie KZ, Anteneh KT, Yohannes Z. Prevalence and Associated Factors of Dysmenorrhea among Secondary and Preparatory School Students in Debremarkos Town, North-West Ethiopia. BMC Women's Health.2018;*18:57.*
18. Perry M. Treatment Options for Dysmenorrhoea. Practice Nurs.2012;23:195–8.
19. Ju H, Jones M, Mishra GD. Smoking and Trajectories of Dysmenorrhoea among Young Australian Women. Tob Control.2016;25:195–202.
20. Faramarzi M, Salmalian H. Association of Psychologic and Nonpsychologic Factors with Primary Dysmenorrhea. Iran Red Crescent Med J. 2014;16(8):e16307.
21. Sahin N, Kasap B, Kirli U, Yeniceri N, Topal Y. Assessment of Anxiety-Depression Levels and Perceptions of Quality of Life in Adolescents with Dysmenorrhea. Reproductive Health.2018;*15:13:1-7.*
22. Lowdermilk, Perry, Cashion. Keperawatan Maternitas (Maternity Nursing). Elseiver;2013.
23. Varney. Buku Ajar Asuhan Kebidanan (Texbook of midwifery care). Jakarta:EGC; 2006.
24. Hillard PAJ. Dysmenorrhea. Pediatrics in Review. 2006;27:64-71.
25. Liedman R, Hansson SR, Howe D, Igidbashian S, McLeod A. Reproductive Hormones in Plasma Over The Menstrual Cycle in Primary Dysmenorrhea Compared With Healthy Subjects. Gynecol Endocrinol. 2008;24:508–513.
26. Akernlund M. Involvement of Oxytocin and Vasopressin in the Pathophysiology of Preterm Labor and Primary Dysmenorrhea. Prog Brain Res. 2002;139:359–365.

27. Yeh ML, Chen HH, So EC, Liu CF. A Study of Serum Malondialdehyde and Interleukin-6 Levels In Young Women With Dysmenorrhea In Taiwan. Life Sciences. 2004;75:669-673
28. Ma H, Hong M, Duan J, Liu P, Fan X, et al. Altered Cytokine Gene Expression in Peripheral Blood Monocytes across the Menstrual Cycle in Primary Dysmenorrhea: A Case-Control Study. PLoS ONE.2013;8(2):e55200.
29. Marjoribanks J, Ayeleke RO, Farquhar C and Proctor M. Nonsteroidal anti-inflammatory drugs for dysmenorrhoea. Cochrane Database Syst Rev.2010;20(1):CD001751.
30. Wong LP, Khoo EM. Dysmenorrhea in a Multiethnic Population of Adolescent Asian Girls. Int J Gynaecol Obstet.2010;108(2):139–42.
31. Sharma N, Sagayaraj M, Sujatha B. Menstrual characteristics and prevalence of dysmenorrhea in college students. International Journal of Scientifc and Research Publications.2014;4(10):1–6.
32. Ortiz MI. Primary Dysmenorrhea among Mexican University Students: Prevalence, Impact and Treatment. European Journal of Obstetrics & Gynecology and Reproductive Biology. 2010;152(1):73–7.
33. Gagua T, Tkeshelashvili B, Gagua D. Primary Dysmenorreahleading Problem of Adolescent Gynecology (review). Georgian Med News. 2012;207:7-14.
34. Gharloghi S, Torkzahrani S, Akbarzadeh AR, Heshmat R. The Effects of Acupressure on Severity of Primary Dysmenorrhea. Patient Prefer Adherence. 2012;6:137–42.
35. Chen MN, Chien LW, Liu CF. Acupuncture or Acupressure at the Sanyinjiao (SP6) Acupoint for theTreatment of Primary Dysmenorrhea: A meta-analysis. Evid Based Complement Alternat Med.2013:493038.
36. Kashefi F, Ziyadlou S, Khajehei M, Ashraf AR, Fadaee AR, Jafari P. Effect of Acupressure at the Sanyinjiao Point on Primary Dysmenorrhea: A Randomized Controlled Trial. Complement Ther Clin Pract. 2010;16:198–202.
37. Wang YJ, Hsu CC, Yeh ML, Lin JG. Auricular Acupressure to Improve Menstrual Pain and Menstrual Distress and Heart Rate Variability for Primary Dysmenorrhea in Youth with Stress. Evid Based Complement Alternat Med. 2013:138537.
38. Nasehi M, Sehhatie F, Zamanzadeh V, Delazar A, Javadzadeh Y, Chongheralu BM. Comparison of the Effectiveness of Combination of Fennel Extract/ Vitamin E with Ibuprofen on the Pain Intensity in Students with Primary Dysmenorrhea. Iran J Nurs Midwifery Res.2013;18:355–9.
39. Navvabi Rigi et al. Comparing The Analgesic Effect of Heat Patch Containing Iron Chip and Ibuprofen for Primary Dysmenorrhea: A Randomized Controlled Trial. Biomed Central.2012.
40. Price AS, Wilson ML. Patofisiologi: Konsep Klinis Proses-Proses Poenyakit (clinical concept of disease process). Jakarta: EGC; 2005.
41. Potter & Perry. Buku Ajar Fundamental Keperawatan (Textbook of fundamental of nursing) Jakarta:EGC;2010.
42. Rahayu D, Yunarsih. The transformation of β Endorphyn level among primigravia inpartu 1st level of active phase by using Comfort Food: Slow-Stroke Back Massage based on comfortable Kolcaba Theory in government hospital, Kediri. The Indonesian Journal of Helath Science. 2016;7(1):17-25.
43. Smeltzer SC, Bare BG. Textbook of Medical Surgical Nursing. Philadelphia: Lippincot Williams & Wilkins; 2009.
44. Londhey VA. Pathophysiology of Pain. Suplement to Journal of The Association of Physicians of India. 2015.
45. Yang M, Chen X, Bo L, Lao L, Chen J, Yu S, Yu Z, Tang H, Yi L, Wu X, Yang J, Liang F. Moxibustion for Pain Relief in Patients With Primary Dysmenorrhea: A Randomized Controlled Trial. PLOS ONE. 2015;1-17.
46. Rauk PN, Friebe-Hoffmann U, Winebrenner LD, Chiao JP. Interleukin-6 Up-Regulates the Oxytocin Receptor in Cultured Uterine Smooth Muscle Cells. Am J Reprod Immunol. 2015;45:148–153.
47. Skarzynski DJ, Miyamoto Y, Okuda K. Production of Prostaglandin F(2alpha) by Cultured Bovine Endometrial Cells in Response to Tumor Necrosis Factor Alpha: Cell Type Specificity and Intracellular Mechanisms. Biol Reprod . 2000;62:1116–1120.
48. Thompson M, Barata da Silva H, Zielinska

W, White TA, Bailey JP. TNF-α-mediated Augmentation of Agonist-Induced Ca2+ Transients in Myometrial Cells. Am J Physiol Endocrinol Metab. 2004;287:E1142–1148.

49. Tamsuri. Konsep dan Penatalaksanaan Nyeri (Concept and treatment for pain). Jakarta: EGC; 2004.
50. Akin MD, Weingand KW, Hengehold DA, Goodale MB, Hinkle RT, Smith RP. Continuous low level topical heat in the treatment of dysmenorrhea. Obstet Gynecol. 2001;97:343–349.
51. Sahin I, Saracoglu F, Kurban Y, Turkkani B. Dysmenorrhea Treatment with a Single Daily Dose of Rofecoxib. International Journal of Gynecology and Obstetrics. 2003;83(3):285–291.
52. Lee I-S, Wallraven C, Kong J, Chang D-S, Lee H, Park H-J. When Pain is Not Only Pain: Inserting Needles into the Body Evokes Distinct Reward-Related Brain Responses in the Context Of A Treatment. Physiology & behavior. 2015;140:148–55.
53. Zhang HZ, Shan SL, Zhong-Xin WU, Wei XM. Effect of Electroacupuncture on SP and PGF2 in Serum of Dysmenorrhea Rats. *Journal of Nanjing University of Traditional Chinese Medicine.* 2014.
54. Ling-Yu LI, Yan P, Jin XF. Efect of Acupuncture at Zhibian Point on T Lymphocyte Subsets of Primary Dysmenorrhea Model Rats. Journal of Clinical Acupuncture Moxibustion. 2016.
55. Totsch SK, Sorge RE. Immune System Involvement In Specific Pain Conditions. Molecular Pain. 2017;13:1–17.

Association of Helicobacter Pylori and Irritable Bowel Syndrome

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ABSTRACT

Background: As a bacteria specialized in inhabiting the gastric mucosa, *H. pylori* is notorious as the chief cause of variable intestinal and extra-intestinal conditions. Yet, the link between *H. pylori* infection with IBS is still debatable. This has provoked us to execute a case-control study searching into the association between *H. pylori* status and IBS.

Objective: This study is designed to explore the association of H. pylori and the development of IBS, along with revealing if there is any association between this infection and the development IBS.

Methods: A descriptive case-control study of 135 individuals was conducted. We select (60) patients from inpatient and outpatient clinic (38 females, 22 males) and were diagnosed as IBS with respect to Rome 4 criteria. Another 75 (42 females, 33 males) seem to be healthy individuals without significant past medical history were assigned as control group.The two groups were subjected to stool antigen for H. pylori and the results were compared between the two clusters.

Results: There was no statistically significant association between HP infection and IBS (p= 0.7). The analysis explored higher prevalence of IBS in younger age group (p= 0.6) with overall female preponderance (p=0.02) and more common in married than single patients (p=0.4, p=0.8; respectively). The most common presentation was diarrhea predominance subtype (p= 0.56).

Conclusion: There is no significant association between H. pylori infection and occurrence of IBS in the general population.

Keyword: *H.Pylori, IBS, Gastric Mucosa.*

INTRODUCTION

IBS is considered to be the most dominant health issues experienced in the family practice, with a global prevalence of (1% - 20%). It classically emerges in early adulthood, even though it could develop in adolescents and in individuals around the age of 45 years; those older than 50 years with symptoms of IBS must have a complete assessment regarding any underlying conditions [(1)]. The disease has significant impact on patients' quality of life [(2,3)] and socioeconomic status[(4)]. Prior studies proposed that abnormal brain-gut interactions, change of intestinal flora, chronic mucosal inflammation, and psychological disorders can be implicated in the pathophysiology of IBS[(5-8)]. As a bacteria specialized colonizing on the gastric mucosa, *H. pylori* is well-known as the chief cause of chronic gastritis, peptic ulceration, gastric carcinoma, and gastric MALT lymphoma[(9-11)]. Moreover, *H. pylori* may have a part in extra-gastric syndromes, perhaps by prompting systemic inflammatory responses [(12,13)]. However, the link between *H. pylori* infection with lower GI disorders chiefly IBS remains unsettled[(14-16)].

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MATERIALS AND METHOD

A descriptive case-control study was carried out in Al-Diwaniyah Teaching Hospital and outpatient clinic in Al-Diwaniyah city from January to June 2018. TO achieve this goal, we select (60) patients from inpatient and outpatient clinic (38 females, 22 males) and were diagnosed as IBS with respect to Rome 4 criteria and by complete history and physical examination and investigated with various set of tests. Another 75 (42 females, 33 males) seem to be healthy individuals without significant past medical history were assigned as control group.

Inclusion Criteria

All patients were selected according to Rome 4 criteria (published in 2016) which are the latest criteria for the diagnosis of IBS. These include: Recurring abdominal pain at least 1 day/week in the last 3 months, accompanied by two or more of the following criteria:

- Related to defecation
- Associated with a change in frequency of stool
- Associated with a change in form of stool.

Criteria achieved for the last 3 months with symptom onset at least 6 months before diagnosis (17).

Exclusion Criteria:

These involve any alarming symptoms, which make the diagnosis of IBS unlikely:

- Rectal bleeding
- Anemia
- Nocturnal symptoms
- Weight loss
- Recent antibiotic use
- Onset after 50 years of age
- Abnormal abdominal examination (organomegally, lump)
- Family history of colorectal cancer or ovarian cancer.
- Family history of inflammatory bowel disease, or celiac disease.

METHODOLOGY

For the purpose of the study, initially we select (67) individuals from inpatient and outpatient clinic who had suggestive symptoms. Both groups underwent full history and physical examination and were investigated regarding the risk of organic diseases in form of complete blood count, ESR, blood glucose level, liver function test, general stool examination, celiac serology, thyroid function test, abdominal ultrasonography. Additional 3 patients were also omitted as they appeared to have some red flag symptoms like rectal bleeding, antibiotic related diarrhea, and abdominal mass by abdominal ultrasonography. Further 2 patients who had Typical Rome 4 criteria refuse to participate in the study. Consequently we assemble 60 patients with characteristic Rome 4 criteria for IBS and willing to continue in the study, 38 were females and 22 were males.In the light of the purpose of our study, both groups were investigated with H. pylori stool antigen test.

Statistical analysis: Information was collected and included in a data-based system and analyzed by statistical package of social sciences (SPSS, Inc., Chicago, IL, USA) version 20. Parametric data were expressed as mean ± standard deviation (SD) such as age. It was evaluated statistically by means of student t-test while non-parametric data were expressed as proportions like male and female were analyzed using chi square.

RESULT

A case-control study enrolled 135 person; 60 patients with IBS as a case group and 75 healthy individuals as a control group (Figure 1). The mean age of cases is 33.5±2.5 and the mean age of control group is 34.8±3.1, sixty five percent of patients in age group of 20-39 years and sixty percent of control is in same age group, while age group 40-59 is 26% in case group and 28% in control as in shown (Table 1):

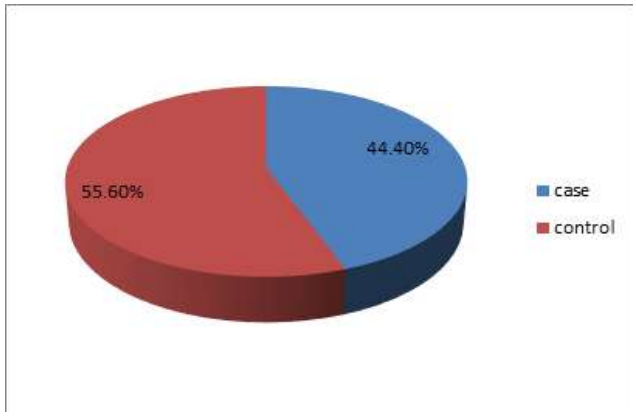

Figure 1: Case–control distribution.

Table 2 shows gender distribution, 63% of cases were female and 37% male, while in control 44% were

female and 56% were male.

Table 1: Age distribution in both groups.

Age group	case	Control	p-value
< 20 year	4(6.6%)	6(8%)	0.91
20-39 year	39(65%)	45(60%)	0.6
40-59 year	16(26%)	21(28%)	0.3
≥ 60year	1(1.4%)	3(4%)	0.5
Total	60	75	

Table 2: Gender distribution in both groups.

Gender	case	Control	p-value
female	38(63%)	33(44%)	0.02
Male	22(37%)	42(56%)	
Total	60	75	

Out 60 cases, there were 35% positive H pylori and 65% negative, and in control there were 30.6% positive H. pylori, and 69.3% were negative for H. pylori, as in (Table 3).

Table 3: The prevalence of H. pylori in case group and control group.

H pylori	case	Control	p-value
Positive	21 (35%) Female(15)	23 (30.6%) Female (11)	0.7
Negative	39 (65%) Female (23)	52 (69.3%) Female (22)	
Total	**60** Female (38)	**75** Female (33)	

In case group, there were 36.65% had IBS-D, 25% had IBS-C, 21.6% had IBS-A, 16.8% had IBS-U. Regarding H. pylori positive patients, there were 38% of them had IBS-D, 23.8% had IBS-C, 19.1% were positive for both IBS-A and IBS-U as (Table 4) shows.

Table 4: show predominant symptoms in cases.

With reference to prevalence gender, age, and residency in IBS patients, as (Table 5) shows, there were 39.5% of female had IBS-D, 29% had IBS-C, 18.5% had IBS-A, and 13% had IBS-U. As for age-group of 20-39 years, there were 33.3% had IBS-D, 30.7% had IBS-C, 20.5% had IBS-A, and 15.5% had IBS-U. Whereas the residency, there were 34% of urban had IBS-D and 31.7% of them had IBS-C, 19.5% had IBS-A, and 14.8% had IBS-U.

Table 5: Predominant clinical varieties of IBS for female gender, age-group and urban residency.

Type of IBS	Gender (female)	Age (20-39)	Residency (urban)
Diarrhea predominant	(39.5%) 15	13(33.3%)	14(34%)
Constipation predominant	11 (29%)	12(30.7%)	13(31.7%)
Alternating predominant	7 (18.5%)	8(20.5%)	8(19.5%)
Unclassified predominant	5 (13%)	6(15.5%)	6(14.8%)
Total	38	39	41
p-value	**0.9**	**0.8**	0.3

DISCUSSION

In reference to (Table 1) that exhibits 135 individuals divided in 4 age groups comprising of (60 patients with IBS, with median age of 33.5 +/- 2.5) demonstrates that IBS is more prevalent in age group of 20-39 (with a percentage of 65%) than other age groups in the case cluster. This result corresponds to a study in Lebanon 2017 which described 67% of cases of the same age group[19]. Other study labeled 40% in same age group in China[20].

These studies can be explained along with what our results have shown that the reasonably high occurrence of IBS in young people may be owing to psychological and emotional influences, such as stress related to studies and exams, finding jobs, monetary status, or marriage.

Our result reveal IBS more occurred in female patients 63% than males 37% as in (Table 2), these

numbers are comparable to those of a study by ford[21] in USA which stated that 62% were female and 38% were male of study sample ,also correspond to other studies worldwide [22, 23]. An alternative research by Farzaneh 2013[23] of the IBS patients, 62.1% were females, 37.9% were males. On the contrary, various studies accomplished in Asia did not expose gender variance prevalence, other resources has identified a predominance of females [24,25]. The basis for this debatable gender dissimilarity is indefinite. Pan et al [26] ascribed this gender variance to female hormones on account of the falling occurrence of IBS in women post-menopause. Chang & Heitkemper[27] designated that gender-related differences in GIT transit time, visceral hyper-excitability, neurological pain processing, neuro-endocrine, autonomic nervous system, and anxiety responses can clarify the majority of IBS in women.

As by (Table 3), our result demonstrated 35% of cases were positive H. pylori and in control group there were 30.6% had positive H. pylori, these finding are not statistically significant (p value 0.7). a study by Antonio Barrios showed that among 38 patients enrolled, 50% were *H. pylori*-positive and 50% were negative[28] and detected that the total infection rate of *H. pylori* in IBS sufferers in the study has no significant association from that of the of control.

In relation to type of IBS, as per (Table 4) it has revealed 36.6% (IBS-D), 25% (IBS-C), 21.6% IBS-A, 16.8 (IBS-U).

In positive H pylori cases, there were 38% (IBS-D), 23.8% (IBS-C), and IBS-A and IBS-U is 19.1% for each subdivision. These result consistent with result by Dorn SD[29] which reported 30% (IBS-D), 25% (IBS-C), 14.3% alternating from positive H pylori cases.

When debate with further studies we established that in study by Farzaneh[23], IBS-C around 52% with interchanging symptoms of mixed subtype (IBS-M) and diarrhea (IBS-D) was the maximum prevalent type of IBS. Of all IBS cases which had a referral to gastroenterology clinic in Iran, Roshandel, *et al*, stated that IBS-A is the utmost prevalent (60%) and IBS-C and IBS-D to be 29.1% and 10.9%, respectively[30].

The higher prevalence of IBS-D in our research may be clarified by the fact that the majority of patients were referred from primary health centers to our gastrointestinal outpatient clinic. General practitioner may be more assured in managing of IBS-C, since IBS-D may request more complex investigation and procedures. Lin et al[31] established an alternate diagnosis for 21% of patients referred from primary health care as IBS-D, whereas no different diagnosis was made for IBS-C [32].

As a final point, in our result we can realize that (IBS-D) with regards to female gender comprises of 39.5% cases, 33.3% of age-group 20-39 years, and 34% of urban residency (Table 5). These statistics parallel to outcome by ford 2014, which labeled those with IBS-D, were younger, more probable to be female [21,33]. On the other hand, a study by Feng Xiong[43] 2016, established that patients between 41-50 years of age had the maximum occurrence of IBS-D with female predominance.

Conflicts of Interest: There is no conflict of interest.

Source of Funding- Self

Ethical Clearance: The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/ have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity.

REFERENCES

1. Canavan C, West J, Card T. The epidemiology of irritable bowel syndrome. Clinical Epidemiology. 2014;6:71-80. doi:10.2147/CLEP.S40245.
2. F. X. Li, S. B. Patten, R. J. Hilsden, and L. R. Sutherland, "Irritable bowel syndrome and health-related quality of life: a population-based study in Calgary, Alberta," Canadian Journal of Gastroenterology, 2003; 17: 259–263.
3. M. El-Salhy, "Irritable bowel syndrome: diagnosis and pathogenesis," World Journal of Gastroenterology, 2012; 18: 5151–5163.
4. G. F. Longstreth, A. Wilson, K. Knight et al., "Irritable bowel syndrome, health care use, and costs: a U.S. managed care perspective," American Journal of Gastroenterology, 2003; 98:600–607.
5. E. Coss-Adame and S. S. C. Rao, "Brain and gut interactions in irritable bowel syndrome: new paradigms and new understandings," Current Gastroenterology Reports, 2014; 16: 379.

6. A. Kassinen, L. Krogius-Kurikka, H. M¨akivuokko et al., "The fecal microbiota of irritable bowel syndrome patients differs significantly from that of healthy subjects," Gastroenterology, vol. 2007;133: 24–33.
7. A. C. Ford andN. J. Talley, "Mucosal inflammation as a potential etiological factor in irritable bowel syndrome: a systematic review," Journal of Gastroenterology, 2011; 46: 421–431.
8. R. Spiller, Q. Aziz, F. Creed et al., "Guidelines on the irritable bowel syndrome: mechanisms and practical management," Gut, vol. 2007; 56: 1770–1798.
9. R. J. Hopkins, L. S. Girardi, and E. A. Turney, "Relationship between Helicobacter pylori eradication and reduced duodenal and gastric ulcer recurrence: a review," Gastroenterology, 1996; 110: 1244–1252.
10. A. C. Ford, D. Forman, R. H. Hunt, Y. Yuan, and P.Moayyedi, "Helicobacter pylori eradication therapy to prevent gastric cancer in healthy asymptomatic infected individuals: systematic review andmeta-analysis of randomised controlled trials.," BMJ (Clinical research ed.),2014; 1: 348.
11. M. K. Sanders and D. A. Peura, "Helicobacter pylori-associated diseases," Current Gastroenterology Reports, 2002; 4:448–454.
12. F. Franceschi and A. Gasbarrini, "Helicobacter pylori and extragastric diseases," Best Practice and Research: Clinical Gastroenterology, 2007; 21: 325–334.
13. S. A. Polyzos, J. Kountouras, C. Zavos, and G. Deretzi, "The association between Helicobacter pylori infection and insulin resistance: a systematic review," Helicobacter, 2011; 16: 79–88.
14. Y.-C. Su, W.-M. Wang, S.-Y. Wang et al., "The association between Helicobacter pylori infection and functional dyspepsia in patients with irritable bowel syndrome," American Journal of Gastroenterology, 2000;95:1900–1905.
15. A. Kawamura, K. Adachi, T. Takashima,M. Yuki, M. Ono, and Y. Kinoshita, "Prevalence of irritable bowel syndrome and its relationship with Helicobacter pylori infection in a Japanese population,"The American Journal of Gastroenterology, 2001; 96:1946.
16. J. Yakoob, Z. Abbas, S. Naz, M. Islam, andW. Jafri, "Virulence markers of Helicobacter pylori in patients with diarrhea dominant irritable bowel syndrome," British Journal of Biomedical Science, 2012;69:vol. 69: 6–10.
17. Harrison's Principles of Internal Medicine, 19th Edition, Gastroenterology Chapter , Page 1968
18. Gastroenterology Research and Practice; Volume 2016, Article ID 3059201, 7 pages; http://dx.doi.org/10.1155/2016/3059201
19. Rajaa Chatila*, Mahmoud Merhi, Essa Hariri, Nada Sabbah and Mary E. Deeb. Irritable bowel syndrome: prevalence, risk factors in an adult Lebanese population. BMC Gastroenterology 2017;17:137
20. Y.-F. Zhao, X.-Q. Ma, R. Wang, X.-Y. Yan, Z.-S. Li, D.-W. Zou & J. He. Epidemiology of functional constipation and comparison with constipation-predominant irritable bowel syndrome: the Systematic Investigation of Gastrointestinal Diseases in China (SILC).Aliment Pharmacol Ther 2011; 34: 1020–1029
21. A. C. Ford, P. Bercik, D. G. Morgan, C. Bolino, M. I. Pintos-Sanchez & P. Moayyedi. Characteristics of functional bowel disorder patients: a cross-sectional survey using the Rome III criteria Aliment Pharmacol Ther 2014; 39: 312–321
22. Hungin AP, Whorwell PJ, Tack J, Mearin F. The prevalence, patterns and impact of irritable bowel syndrome: an international survey of 40,000 subjects. Aliment Pharmacol Ther 2003;17:643-650.
23. Farzaneh N, Ghobaklou M, Moghimi-Dehkordi B, Naderi N, Fadai F. Effects of demographic factors, body mass index, alcohol drinking and smoking habits on irritable bowel syndrome: a case control study. Ann Med Health Sci Res 2013;3:391-396.
24. Si JM, Chen SJ, Sun LM. An epidemiological and quality of life study of irritable bowel syndrome in Zhejiang province. Zhonghua Nei Ke Za Zhi. 2003;42:34–7.
25. Gwee KA, Wee S, Wong ML, Png DJ. The prevalence, symptom characteristics, and impact of irritable bowel syndrome in an Asian urban community. Am J Gastroenterol. 2004;99:924–31.
26. Pan CH, Chang CC, Su CT, Tsai PS. Trends in irritable bowel syndrome incidence among

Taiwanese adults during 2003-2013: a population-based study of sex and age differences. PLoS One 2016; 11:e0166922 .

27. Chang L, Heitkemper MM. Gender differences in irritable bowel syndrome. Gastroenterology 2002;123:1686-1701.
28. Antonio Barrios*, Adriana Barrios Fernandez, Angela Alvarez and Eviralda Méndez Helicobacter pylori Infection Is Associated with Development of Irritable Bowel Syndrome J of Exploratory Research in Pharmacology 2016;1:13-15
29. Dorn SD, Morris CB, Hu Y, Toner BB, Diamant N, Whitehead WE, et al. Irritable bowel syndrome subtypes defined by Rome II and Rome III criteria are similar. J Clin Gastroenterol. 2009;43:214–20.
30. Roshandel D, Rezailashkajani M, Shafaee S, Zali MR. Symptom patterns and relative distribution of functional bowel disorders in 1,023 gastroenterology patients in Iran. Int J Colorectal Dis. 2006;21:814–25.
31. Lin S, Mooney PD, Kurien M, et al. Prevalence, investigational pathways and diagnostic outcomes in differing irritable bowel syndrome subtypes. Eur J Gastroenterol Hepatol 2014;26:1176-80.
32. Cristiane Kibune-Nagasako, Ciro Garcia-Montes, Sônia Lecia Silva-Lorena and Maria Aparecida-Mesquita. Irritable bowel syndrome subtypes: Clinical and psychological features,body mass index and comorbidities. Rev Esp Enferm Dig 2016; 108 : 59-64
33. Asieh Mansouri, Mostafa Amini Rarani, Mosayeb Fallahi, Iman Alvandi. Irritable bowel syndrome is concentrated in people with higher educations in Iran: an inequality analysis Epidemiol Health 2017;39:8.

Groundwater Contamination of Some Soils Near The Kefal River

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ABSTRACT

Groundwater is the water that is located below the surface of the earth and forms all or some of the spaces in the rock formations which are originally rainwater or river water or water resulting from the melting of the ice as it seeps into the ground and form a layer of groundwater and be on two types of water close of the surface of the earth as in the study area and groundwater beyond the surface of the ground and the groundwater despite some of their layers from the ground level of the most important sources of freshwater liquid has received great attention from specialists in the field of environmental protection. The pollution of water damage and corruption of water quality on this leads to pollution and malfunction in its system, which reduces its ability to perform its natural role and makes it lose much of its economic value and cause many health and environmental damage when used. Water is contaminated by many human, plant, mineral, industrial or chemical waste, the study is an agricultural area with fertile soil suitable for agriculture and animal husbandry.

Keywords*: Environmental Protection, Groundwater, Kefal River, Elements*

INTRODUCTION

The groundwater accumulates under the outer crust of the earth. These water resources are considered the main sources of water resources [(1)]. Random use guide him. The wealth of groundwater in Iraq and in the study area where the water is close to the surface of the earth and the inhabitants of these areas are used for domestic purposes and watering the plantations during the water scarcity through the wells of artesian. Ground wells have long been the main sources of water away from pollution as a result of what they do the soil is a candidate for water, but this belief is changing now. In many cases, the wells are close to the surface of the earth, which increases the chance of biological or chemical pollution [(2)]. This is what we observe in the study area because it is located between the Indian Shatt and the Kefl River and is exposed to flooding during the period of water increase. The groundwater is very close to the surface of the earth not exceeding a few centimeters. Wells with a depth of 40-50 feet are less likely to be contaminated because water passes through semi-porous porous layers that filter and purify water from most Impurities. Groundwater is also polluted by waste and waste from factories, oil pipelines, mines, and radioactive materials, as well as pollutants from agriculture due to the use of industrial fertilizers, pesticides, and wild animals [(3)]. This is what we saw in the study area during the field study because it is famous for breeding sheep, cows, buffalo, and goats. Groundwater is difficult to get rid of this pollution, or to conduct any treatment of existing water-bearing classes where groundwater pollution leads to the reduction of water use in various purposes in addition to damage to human life. That animals and plants by causing various diseases. [(4)]

The causes of groundwater pollution in the area near the Kefl River and what is the quality of the water and its suitability for different uses in the study area. The various human activities represented by agricultural activity and civil activity are directly related to pollution of groundwater in the study area.

The need for this study emerged as a result of the water scarcity experienced in the study area and the lack of surface water represented by the Indian steppe and the Kefl River due to the low water level of Shatt Hindi which causes the lack of water to flow into streams and rivers. The chemical and physical elements of groundwater in

the study area. [5]

The importance of research is that the groundwater is one of the most important sources of liquid fresh water, which highlights its importance and the great role it plays from the human need of water in the study area which is located near the Kefl river and so close to the surface of the earth so it can be used in watering crops Animals and other human uses especially during drought time the area was totally dependent on the water so it was used to drink by some people.

Geology of the study area

The area of the study is located in the district of Hilla in the province of Babylon within the scope of the sedimentary plain in the unstable pavement in relation to the division of Iraq, where this range is called the scope of Mesopotamia between the mountains of Zakros in the north-east and the Arab plateau in the south-west and covers the research area in general sediments Of the four-year-old Pleistocene. The deposits of this sediment are characterized by the easy flux of both the Euphrates River and its branches. These sediments are generally composed of thin layers of fine sand, silt, and mud, whereas wind sediments are found in the eastern parts of the plains (E). [6]

Geomorphology Study Area

The study area is located in Babil Governorate within the Sedimentary Plain, which is characterized by its flat surface, its incline and low general slope. The slope is about 22 cm per kilometer. Some dunes are found in some areas such as south of Hilla. Winds are shapes according to their direction. Agriculture has increased the soil level by (mm) per year, Groundwater in general is close to the surface and its salinity ranges from (10000) to (50000) ppm for the entire governorate. The center of Hilla city is about (1000-3000) ppm.

Components of groundwater from salts

The concentration of dissolved salts in groundwater is a measure to determine their suitability for the general use of groundwater, such as domestic use, drinking, agriculture, industry, and power generation. Table (1) shows. The qualitative division of groundwater according to dissolved total salts.

Table 1. Shows the qualitative division of groundwater according to dissolved total salts.

Water quality	Total dissolved salts mg/ L
fresh water	0 - 1000
Salted Water	1000 - 10000
Saline Water	10000- 100000
High salinity water	More than 100,000

Groundwater sources: - Groundwater sources are divided into three sources

Air or water falling: - The main source of groundwater, including rainfall and water flowing on the surface of the earth and water resulting from the melting of snow, to access these waters to the ground during the layers of rock as in the study area.

Water geological or fungal: - The water arising or composed of rocks between fresh water or the sea and the cohesion of the edges of the rocks, they store water droplets between the spaces forming one of the sources of groundwater.

Collective water or water crystallization of magma: - The water associated with the events of the volcanic and volcanic events that occur during the formation of igneous rocks and known as the rising water or underground water, which contains a high percentage of dissolved minerals and high temperatures.

water crystallization of magma: - include the water associated with the volcanic events that occur during the formation of igneous rocks and include the remaining solutions of water crystallization of magma known as the name of water rising and characterized by a high proportion of soluble salts and have a high temperature and often mixed with water to decrease its temperature And the salt concentration is less.

Waste

Like the area near to the river Kefl and Shatt Hindi high population density generated by different types of waste as this area does not reach municipal cars for cleaning, so they throw their industrial waste or from household and other uses, whatever their forms, whether solid or semi-solid or liquid It is dumped in exposed areas and buried in a thin layer of soil and since the groundwater is close to the surface of the earth when this area to sink water from the irrigation of crops or irrigation, wrong or excessive or the fall of rain or

exposure to the waters of the falcon deposition some of the components of these wastes After being dissolved or dissolved into the aquifer. [7]

Table.2 shows the results of the chemical tests of selected samples for the area near the Kefl River for the year 2017-2018

NO.	Type of examination	Environmental determinants	Bashni Location (2)	Ibn Tufail Location (3)	Awfi Location (4)	Alshimary Location (5)	Al-Fanhara location (6)
1	Electrical connection EC	–	2.6	2.8	2.9	2.3	2.7
2	PH	_	8.3	8.2	8.1	8.4	8.7
3	Mercury	0,002	NIL	0.0025	0.029	0.031	NIL
4	Nickel Ni	0.02	0.126	NIL	0.110	NIL	Nil
5	Lead PB	0.1	Nil	0.068	0.052	Nil	Nil
6	Copper Cu	1	Nil	0.90	Nil	Nil	0.290
7	Zinc Zn	0.5	Nil	0.171	0.69	Nil	Nil
8	Cadmium Cd	0.003	0.002	Nil	0.001	Nil	Nil
9	Sodium Na	_	10.8	10.9	10.7	10.2	10.2
10	Sulfates SO4	_	7.00	7.77	7.15	6.55	7.4

Results of chemical analysis conducted in the Directorate of the Environment of Babil province on 15/11/2017

1. Electrical connection EC

Table 2 shows that the groundwater salinity of the study area and the sites affected by agricultural and animal wastes, as these areas are known for the cultivation of fruits and vegetables, as well as date palms, especially sites (2.3.5). Groundwater in these sites is highly saline according to the International Classification of Irrigation Water. Due to faulty irrigation.

2. Alkaline and acidic PH

Water is acidic if the value of ph. 1-6 and if the base is ph. Between (14-18) or if the value of ph. (7) the water is ideal or neutral. It appears from Table (2) that ph. The groundwater in the study area is of a basic nature and for all the studied sites due to the low presence of carbon dioxide in this water, as its solubility in the water leads to the transformation of water from the acidic to the basal. [8]

3. Mercury: - hg

The element of mercury is toxic and dangerous, and if it is present in drinking water at a higher rate than its normal presence, it will be very dangerous for its users for agricultural purposes or drinking (Table 2 shows that the water of the study area is not polluted by the element of mercury, (0.031) due to the exposure of this site to insecticides and fungus being agricultural area in addition to that mercury affects the nervous system and reproductive system causes tremor and imbalance and kidney failure and menstrual irregularity in women and abortion and cerebral palsy.

4. Nickel: - NI

Nickel is found in acidic and oxidizing environments. The recipe for this environment is reflected in its presence in the Earth's crust in the form of oxides, carbonates and silicate with iron. Nickel concentration in the earth's crust is equal to (01.0%). It is concentrated in basal rocks and is cobalt- Nickel is also found in Iraqi fertilizers (Table 2) shows that the study area and all sites are not contaminated with nickel.

5. Lead: - Pb

Lead is found in many rocks where it is found in the minerals of igneous rocks above the base such as olefin and is slightly in groundwater due to the lack of melting of lead compounds in groundwater. Lead is considered to be a toxic element of regeneration and its concentration causes cancer, brain damage, Lead types of the most dangerous types of lead produced in oil and its derivatives. The element of lead is a toxic element and its effect in water is easier than hard water. Table (2) shows that the minimum lead (nil) and the upper limit (0.068) showed that the water in the study area is not contaminated with the lead element and all the studied sites. [9]

6. Copper: - Cu

Copper is a natural element in nature where it is found in the form of sulfide or oxides. Its concentration is increased by increasing the temperature and increasing the acidity of water (ph) and 1.0ppm is present in groundwater. p.m)) Water is toxic and causes degenerative diseases, diarrhea and fatal heart disease of humans. The concentration of copper in the study area according to the table (2) has a minimum of (nil) and a maximum of 0.390 at site (5). The study area is not contaminated with copper.

7. Zinc: - ZN

The concentration of zinc is low in groundwater due to its weak solubility in moderately acidic water and its concentration increases with water acidity and is ionized when ph. (9.7). Table (2) shows that the lowest percentage in the study area (nil) and the highest 0.171) at the site (2). This means that the study area is not contaminated with zinc. [10]

8. Cadmium: - CD

The most important sources of cadmium are phosphate fertilizers, heavy dirty household water, and industrial waste. Cadmium is a toxic and polluting element of the environment and has little importance in life processes. Cadmium causes kidney failure, acute pulmonary embolism, chronic pneumonia, and pneumonia. Table (2) shows that the minimum cadmium in the study area (nil) and the upper limit (0.002) at Site 1 shows that the study area is not contaminated with cadmium and is found to be within the permissible limit according to the 1996 Iraqi specifications of (0.003) The limit of rare elements in groundwater.

9. Sodium: - Na

Sodium belongs to alkaline minerals and is the only element found in large quantities in groundwater. Sodium salts are high in groundwater where concentrations in groundwater are from (10-100 mg / L). Table (2) shows that the study area is not Contaminated and for all sites.

10. Sulfate: - SO4

The sulfates in groundwater are composed of water gypsum and anhydrous gypsum (CASO4). The igneous and transformative rocks contain less than 100 mg / L of sulfates. In addition, they contain magnesium sulfate called salt or sodium sulfate, Bitter taste in the presence of sufficient quantities. As for people who are not used to drinking water containing a high proportion of sulfates cause them diarrhea.

CONCLUSION

Groundwater in the area between the Kaffl and Shatt al-Hindi is an important source on which water is scarce because it is an area with fertile agricultural soil known for growing fruits and vegetables of all kinds, as well as palm trees. This study deals with the study and analysis of the impact of agricultural and human waste on the groundwater pollution of the study area and its validity for various uses of life. This study was based on the collection and analysis of five models of selected groundwater areas of the area near the Kefal River. Each model has 10 chemical and physical elements for 2017-2018 and is found to be uncontaminated with groundwater in the study area.

Ethical Clearance: People identified as potential research participants because of their status as relatives or carers of patient's research participants by virtue of their professional role in the university and departments.

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Conflict of Interests: The authors declare there is no conflict interests

REFERENCES

1. Badiri, Najah Kazem, Study of the chemical properties of groundwater in the city of Hilla and knowledge of sources, Journal of the University of

Babylon, Engineering Sciences Volume V, 2000. vol.18, no. 487, pp. 330-7

2. Iyad Barakat, Earth Sciences, I, Dar Safa for Publishing and Distribution, Amman Jordan, 2008. vol.11, no. 47, pp. 33-5
3. A. H. Jabbar, M. Q. Hamzah, S. O. Mezan, N. N. Hasan, and M. A. Agam, "A Continuous Process for the Preparation, Characterization and Study Thermal Properties of Nickel Oxide Nanostructure, 2018" Int. J. Sci. Eng. Res., vol. 9, no. 3, pp. 590–602.
4. Zorca, Mohamed Khamis environment and the axes of deterioration and its effects on human health, without the edition number Dar Al - Maarifa University, 2000. vol. 94, no. 3, pp. 211-21.
5. Karbal, Abdul-Ala Rizouki, the spatial variation of the adequacy of drainage systems (Balzl), and reclamation of land in the province of Babylon Ph.D. thesis, (G 0 m), Faculty of Arts, University of Baghdad, 2001. vol. 19, no. 6, pp. 213-21.
6. A. H. Jabbar, M. Q. Hamzah, S. O. Mezan, N. N. Hasan, and M. A. Agam, "A Continuous Process for the Preparation, Characterization and Study Thermal Properties of Nickel Oxide Nanostructure, 2018" Int. J. Sci. Eng. Res., vol. 9, no. 3, pp. 590–602.
7. Asadi, Kifah Saleh, Effect of agricultural waste on surface water pollution in Najaf Babel Journal of Human Sciences, Scientific Conference of the Faculty of Basic Education, Volume II, 2007. vol. 487, no. 7407, pp. 330-7.
8. Al-Ani, Saadi Abdul-Jabbar, Hydrography and Chemistry of Natural Spring Water from Hit to Samawah-Western Desert-Iraq, Master Thesis, University of Baghdad, 1986. vol. 487, no. 74, pp. 333-6.
9. A. S. B. A. and M. A. A. Abdullah Hasan Jabbar, Maytham Qabel Hamzah, Salim Oudah Mezan, "Green Synthesis of Silver / Polystyrene Nano Composite (Ag / PS NCs) via Plant Extracts Beginning a New Era in Drug Delivery, June 2018" Indian J. Sci. Technol., vol. 11, no. 22, pp. 1–9.
10. Al-Ani, Thaer Saleh Mohammed, Geochemical and Sedimentary Study of Central and Southern Spakhy Areas, Master Thesis (G0M), Faculty of Science, University of Baghdad, 1986.

Relationship of Patient Characteristics with Patient Satisfaction

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ABSTRACT

Patient satisfaction becomes one of the indicators used as the initial imaging in providing good service to patients. The data of patient satisfaction assessment of PLK Unair in the last three year, overall approaching the achievement of the target set. However, there is a decreased performance from 2015 to 2016. The health care provider needs to understand the patient's characteristics for decision-making regarding the services provided so that the patient can be satisfied. The objective of the study was to analyze the relationship between respondent characteristics (sex, age, education, and occupation) with patient satisfaction. The study was conducted at the Airlangga University Healthcare Center (PLK) in November 2017. The population of this study were all patients who visited PLK Unair. Sampling technique using accidental sampling for 100 respondents. The statistical test used by Chi-Square test. The results showed that the characteristics of the respondents are mostly women as many as 65%, young as many as 80%, high education as many as 96%, and unemployed as many as 72%. Of the 100 patients, less satisfied were 64%. The statistical test results between sex, age, education and occupation with patient satisfaction respectively were 0.055, 0,000, 0.260, and 0.006. The conclusion is no relationship between sex and education with patient satisfaction. There is a relationship between age and work status with patient satisfaction. The suggestion is to be expected by doing a periodic satisfaction assessment can be a benchmark of service success.

Keywords: *patient characteristics, patient satisfaction*

INTRODUCTION

Nowadays, the company is experiencing a great competition, it can also be felt in healthcare. Healthcare providers are required to prioritize patient satisfaction so that patients will be satisfied with the service. To obtain such satisfaction, the service provider must be in contact with the recipient of the service in informing, engaging and motivating the patient in achieving recovery.

The measure of the success of service delivery is determined by the level of satisfaction of the service recipient. Service receiver satisfaction is achieved when the recipient receives the service as required and expected. Service recipients also expect a quality service, because with a quality service then the recipient will feel satisfied.

Patient satisfaction is important for healthcare providers[1] and will affect the marketing of the Healthcare Center of Campus C, Universitas Airlangga. The emergence of various forms of competition in providing services in the community both provided by government agencies and private, and many other agencies serving service in the community is a heavy burden for Healthcare Center Campus C Univeritas Airlangga to further improve the quality of services provided at the clinic.

Based on the data assessment of patient satisfaction PLK Unair in the last three year, overall approaching the achievement of the target set. However, there is a decrease in the achievement of satisfaction assessment from 2015 to 2016. Achievements in 2014 amounted to 99.08%, 2015 by 101.85%, and in 2016 97.90%[2].

Patient services are activities that undertaken to meet the needs, wants and expectations of patients. If the service received is in line with patient expectations it means the service has satisfied the patient. To understand how to satisfy the patient is to identify the needs and wants of the patient[3]. The needs, wants, and expectations

of the patient can be identified by looking at the characteristics of each patient. Healthcare providers need to understand the characteristics of patients for decision-making related to hospital services so that services are provided in accordance with the needs and wants of the community in general and patients in particular[3].

The characteristics of the patient are the particular characteristics or special identity attached to the user of the health service or the hospital patient, can be used to equalize or distinguish the patient with another patient and assumed to generate the same or different reactions among patients. The reaction of a person who produces the same or different judgments is largely determined by the background or individual characteristics, such as age, sex, education, occupation, and income. The magnitude of the influence of patient characteristics on the aspect of the quality of health services in the hospital can lead to feelings of satisfaction or dissatisfaction[4].

According to the study of Abdillah AD and Muhammad Ramdan (2016) mentioned that there is a relationship between patient characteristics (sex, age, education, occupation) with outpatient satisfaction in Puskesmas Sindangkerta West Bandung regency[5]. Based on the description above, the researcher wanted to know how the relationship between patient characteristics (sex, age, education, and occupation) with patient satisfaction at PLK Airlangga University Surabaya in November 2017.

MATERIAL AND METHOD

This research is an analytic obervasional research with cross sectional study design. Data collection was conducted in November 2017. The population in this study was all patients who visited PLK Unair. Sampling was done by non-probability sampling with accidental sampling. Samples were taken accidentally, if there have been found visitors who want to get the health services, then they will become samples. The sample in this study were 100 respondents. Respondents were interviewed with questionnaires.

The questionnaire contains questions about the characteristics of respondents consisting of age, sex, education, work status and income, and questions about patient satisfaction consisting of 21 items of questions that have been tested for their validity and reliability. In this research, patient satisfaction variable is categorized into 2, that is satisfied and not satisfied. Patient is satisfied if got score from patient satisfaction questionnaire >mean. The statistical test used by Chi-Square test.

RESULTS AND DISCUSSION

A) Results

Based on the results of interviews with the help of questionnaires instruments to 100 respondents, the result can be seen as follows:

Table 1. Relationship between Patient Characteristics and Patient Satisfaction of PLK Unair in November 2017

Patient Characteristics	Patient Satisfaction				Total		P-value
	Less Satisfied		Satisfied				
	n	%	n	%	n	%	
Gender							
Male	18	51,4	17	48,6	35	35,0	0,055
Female	46	70,8	19	29,2	65	65,0	
Age							
Young	58	72,5	22	27,5	80	80,0	0,000
Old	6	30	14	70,0	20	20,0	
Education							
Low	1	25	3	75,0	4	4,0	0,260
High	63	65,6	33	34,4	96	96,0	
Occupation							
Unemployed	52	72,2	20	27,8	72	72,0	0,006
Employed	12	42,9	16	57,1	28	28,0	

B. Discussion

Relationship of gender with patient satisfaction

Based on the table above, it is known that most patients with female as many as 65%. Patients with female but less satisfied as many as 70.8%. Based on statistical test by using chi square test, it was found that p-value = 0,055 (> 0,05). This means that there is no relationship between gender and patient satisfaction at PLK Unair in November 2017.

According Rahman (2006) and Mohammed (2011) states that men have a higher level of satisfaction than women[6]. This research is in line with research of Christasani PD & Satibi (2016) which states that there is no relation between sex to satisfaction shown by p = 0,683 (p> 0,05)[7]. Hidayati AD's research, Chriswardani Suryawati & Ayun Sriatmi (2014) also stated that there is no relationship between gender to satisfaction[7,8].

Relationship of age with patient satisfaction

Based on the table above, it is known that most patients are young patients as many as 72%. Patients who are young but dissatisfied as many as 72.5%. The young patients in this study were patients <35 years of age. Based on statistical test by using chi square test, it was found that p-value = 0,000 (<0,05). This means that there is a relationship between age and patient satisfaction at PLK Unair in November 2017.

WHO study in nine developing countries has concluded that the largest population using health care facilities is the five-year-old age group and the 30-35 year age group. Previous research conducted by Abdillah AD & Muhamad Ramdan (2016) mentioned that age group more than 30 years 63,2% expressed satisfaction, whereas in age group less than 30 years only 21,8% who expressed satisfaction[5].

From this it can be seen that the age group of less than 30 years tends to be dissatisfied compared to the age group more than 30 years. This is in accordance with the opinion of Lumenta (1989) that this productive age group tends to be more demanding and expect much towards the ability of basic health services and tend to criticize. According to Rahman (2006) states that satisfaction based on productive age has greater demands and expectations than old age[6]. This study is in line with the results of research conducted by Farianita R (2016), which states that there is a relationship between age and patient satisfaction[9].

Relationship of education with patient satisfaction

Based on the table, it is known that most patients with higher education as much as 95%. Highly educated but unsatisfied patients were 65.6%. Based on statistical test by using chi square test, it was found that p-value = 0,260 (> 0,05). This means that there is no relationship between education and patient satisfaction at PLK Unair in November 2017.

According to Mar'at, the feeling of satisfaction on each individual is not the same, but the expression of satisfaction on a group of individuals can occur almost the same because of the influence of the environment and society of certain groups. Just as Azrul Azwar (1994), points out that as well as the quality of service the dimensions of patient satisfaction vary greatly. So patient satisfaction is not only influenced by one's education but on other aspect[10].

Lumenta (1989) states that a person with a higher level of education tends to demand or criticize a lot of services he receives if he is not satisfied. Someone with a low level of education, he tends to receive more because he does not know what he needs, as long as heal it is enough for him.

Carr and Hill (1992) argue that highly educated societies tend to be dissatisfied because their knowledge demands better service[11]. This study is in line with research conducted by Hidayati AN, Chriswardani Suryawati & Ayun Sriatmi (2014) who found that there is no relationship between education and patient satisfaction level[7,8].

Relationship of work status with patient satisfaction

Based on the table above, it is known that most patients are unemployed as many as 72%. Patients who are unemployed in this study were patients with status as students, students, housewives, retired and jobless. Patients who are unemployed but less satisfied as many as 72.2%. Based on statistical test by using chi square test, it was found that p-value = 0,006 (<0,05). This means that there is a relationship between work and patient satisfaction at PLK Unair in November 2017.

This is not in accordance with the Rahman (2006)

opinion which states that people who work (employed) tend to have higher expectations than people who do not work (unemployed)[6]. This research is also not in line with the opinion of Lumenta (1989) which states that a person working is more likely to demand or criticize the service he received if it is not satisfied for him compared with the unemployed. However, this study is in line with research conducted by Abdillah AD & Muhamad Ramdan (2016) who stated that there is a relationship between occupation and patient satisfaction[5].

CONCLUSIONS

The conclusions of this study are:

1. Characteristics of respondents in this study mostly are women as many as 65%, young as many as 80%, high education as many as 96%, and unemployed as many as 72%. Of the 100 patients, patients were dissatisfied as many as 64%, while 36% satisfied.
2. There is no relationship between gender and patient satisfaction in PLK Unair in November 2017 (p-value = 0,055).
3. There is a relationship between age and patient satisfaction at PLK Unair in November 2017 (p-value = 0,000).
4. There is no relationship between education and patient satisfaction at PLK Unair in November 2017 (p-value = 0.260).
5. There is a relationship between occupation and patient satisfaction at PLK Unair in November 2017 (p-value = 0.006).

The suggestions that can be given are:

1. The management of PLK Unair is expected to conduct periodic satisfaction appraisal in order to be a measure of service success.
2. Provide a means to facilitate customers in submitting a complaint through a suggestion box or SMS complaints.
3. Facilitate access to information services to customers by using social media is growing.

Ethical Approval: Related departments should be assured about the confidentiality of the results of questionnaires.

Conflict of Interest: The authors report no conflict of interest.

Source of Funding: Self

REFERENCES

1. Surydana, Liga. Service Quality, Customer Value and Patient Satisfaction on Public Hospital in Bandung District, Indonesia. International Review of Management and Marketing, 2017, 7(2), 187-192.
2. Pusat Layanan Kesehatan (PLK). Data Penilaian Kepuasan Pasien. Universitas Airlangga. 2016.
3. Ariadi, Hilal. Persepsi Pasien Terhadap Mutu Pelayanan Dokter Ditinjau dari Karakteristik dan Mutu Pelayanan Dokter di Instalasi Rawat Jalan RSI Sunan Kudus Tahun 2005. Tesis, Universitas Uponegoro, Semarang, 2005.
4. Utama, S. Memahami Fenomena Kepuasan Pasien Rumah Sakit. Medan: Fakultas Kesehatan Masyarakat-Universitas Sumatera Utara. 2003.
5. Abdilah AD & Muhamad Ramdan. Hubungan Karakteristik Pasien dengan Kepuasan Pasien Rawat Jalan di Puskesmas Sindangkerta Kabupaten Bandung Barat. Jurnal Kesehatan Kartika Stikes A. Yani. 2016.
6. Rahman, Arip. Analisis Kepuasan Pasien Rawat Inap di RS Islam Tasikmalaya. Tesis. FKM-Universitas Indonesia, Jakarta. 2006.
7. Christasani PD & Satibi. Kajian Faktor Demografi Terhadap Kepuasan Pasien Jaminan Kesehatan Nasional Pada Fasilitas Kesehatan Tingkat Pertama Jurnal Farmasi Sains Dan Komunitas, Vol. 13 No. 1 Mei 2016, Hlm. 28-34.
8. Hidayati AD, Chriswardani Suryawati & Ayun Sriatmi. Analisis Hubungan Karakteristik Pasien Dengan Kepuasan Pelayanan Rawat Jalan Semarang Eye Center (SEC) Rumah Sakit Islam Sultan Agung Semarang. Jurnal Kesehatan Masyarakat (e-Journal), Volume 2, Nomor 1, Januari 2014.
9. Farianita R. Faktor-Faktor yang Berhubungan dengan Kepuasan Peserta BPJS Terhadap Pelayanan Instalasi Rawat Jalan di Rumah Sakit Tk. Iii Bhakti Wira Tamtama Semarang. Skripsi Universitas Negeri Semarang 2016.
10. Azwar, Azrul. Program Menjaga Mutu Pelayanan Kesehatan. Yayasan Penerbit IDI. Jakarta. 1994.
11. Carr And Hill. The Measurement of Patient Satisfaction. Journal Pub Health Med. 1992.

Evaluation on Preparation of Fire Hazards in Pt. X Muncar Banyuwangi
(Study on Fish Canning Company in Muncar Banyuwangi)

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ABSTRACT

Fire is a disaster event that comes from an unwanted fire and can cause harm. Decree of the Minister of Manpower of the Republic of Indonesia Number. 186 / MEN / 1999 on Fire Prevention in the workplace, so that fire hazards can be prevented and avoided as early as possible. This study aims to evaluate the preparedness of fire prevention in PT. X MuncarBanyuwangi through observasional with cross seccional approach. Population in this research is all employees of production at PT. X Muncar Banyuwangi as many as 90 people. Data collection is done by using questionnaire, observation and examination. Data processing is done by descriptive analysis and correlation by using spearman test. The result of research of correlation between age with employee knowledge have weak relation (ρs = -0,340), relationship between training with employee knowledge have medium relation (ρs = 0,350), relation between working period of respondent with level of knowledge in preparedness fire prevention at PT. X in the weak category (ρs = -0.089), and the relationship between socialization and application of fire prevention procedures and readiness to the knowledge of employees at PT. X in the weak category (ρs = -0.127), while the observation result of infrastructure inspection obtained APAR (73.3%), hydrant, fire alarm, detector, sprinkler (0%) because the tool is not installed in PT. X, place of assembly (100%), exit signs (50%), emergency stairs and emergency exit (0%). Implementation of fire prevention preparedness at PT. X can work well if all elements of the fire hazard management system are implemented thoroughly.

Keywords: *evaluation, fire, fire prevention preparedness, knowledge*

INTRODUCTION

The fire emergency response system is part of the fire management management process in the readiness of building management in anticipating a fire emergency within a building. One workplace that has a fire risk is a fish canning factory. Fire risk occurring in fish canning plant has a high rank, then evaluation is needed in an effort to improve the implementation of fire prevention preparedness at PT. X Muncar Village Banyuwangi. Building of PT. X Muncar Banyuwangi equipped with facilities and infrastructure include management office, production room, clinic room, and other supporting infrastructure such as laboratory space.

In the process of production of fish processed in the exhaust box of fish cooked by using steam heat generated by boilers with a high enough temperature, the use of equipment requires a large electric power in case of surge or excess electric current so that the heat can cause a fire. According to the NFPA[3] itself, the classification of fire hazards of fish canning industry is classified into class A fire hazard (fire with paper, cloth, plastic and wood), class B (fire caused by methane, ammonia and diesel) and class C (electric fire). With the risk of this PT. X Muncar Banyuwangi does not have emergency procedures understood by all employees and management, so it is possible if there is a fire hazard, there is no effective and efficient rescue procedure and can be an evaluation so that the need for management readiness in the implementation of fire emergency response in PT. X Muncar Banyuwangi. Fires are caused by various factors, but in general the factors that cause fire are human and technical factors[8]. In case of fire in Indonesia around 62.8% is caused by electricity or short circuit of electric current. Spatial planning and lack of fire prevention infrastructure also contribute to the

emergence of fires, particularly fires in industrial estates and settlements.

According to the Decree of the Minister of Manpower R.INo.KEP.186 / MEN / 1999 on Fire Response Unit at Work[2], the fish canning industry is classified as a high risk level of fire hazard and if there is a fire will have a considerable impact, important to do. For this purpose, Law No. 1 of 1970 concerning occupational safety has stipulated that every workplace should make efforts to create workplaces and survivors, including from fire hazards.

Observation result of fire hazard protection in PT. X Muncar Banyuwangi there is an active fire protection system in the building building in the production area is not good because there are some components that have not met the standard. In alarms, detectors, sprinklers, hydrants are still not available, the APAR component is only the label component of the officer's name that maintains the card or APAR label is not yet available, and there are some rusty and poorly grounded APARs. It is therefore necessary to evaluate the preparedness of fire prevention in order to increase awareness of fire disaster.

Results of subsequent interviews with the management of PT. X Muncar that based on the Decree of the Minister of Manpower RI No. 186 / MEN / 1999 on Fire Management at Work[2], PT. X muncar Banyuwangi does not yet have a fire organizational structure so that in the implementation of emergency response the fire hazard has not been implemented properly, this is causing the effort in prevention and handling fire hazard is not running maximally.

The purpose of this study is to evaluate the implementation of fire prevention preparedness at PT. X Muncar Banyuwangi based on Minister of Manpower Decree No. RI. 186 / MEN / 1999 on Fire Management in the Workplace[2].

MATERIAL AND METHOD

This research uses quantitative method with cross sectional awakening design which aims to photograph and analyze the situation in a certain time period against the evaluation of fire preparedness prevention in PT. X Muncar Banyuwangi. The data were collected by questioner and question and answer. While the observation with cross sectional study approach and by way of examination by using check list list. Data processing is done by correlation analysis using spearman test. Population in this research is all employees of production at PT. X Muncar Banyuwangi as many as 90 people.

FINDING

Table 1. The relationship between age and employee knowledge in PT. X Muncar Banyuwangi

No.	Age	Level of Fire Preparedness Readiness						Total		ρ_s
		Low		Medium		High				
		n	%	n	%	n	%	N	%	
1.	<25 years old	8	61,5	4	30,8	1	7,7	13	100	0,084
2.	25-45 years old	13	27,7	30	63,8	4	8,5	47	100	
3.	>45 years old	2	6,7	11	36,7	17	56,7	30	100	

Table 1 shows that the age of employees <25 years old are 8 people with a percentage (61.5%) have low knowledge, 25-45 years old employees turn out 30 people with percentage (63.8%) have medium knowledge and age> 45 year turns out 17 people with a percentage (56.7%) have a high knowledge. From the table it can be concluded that age with knowledge level has weak relationship because of the older age of employees the better the level of knowledge.

Table 2. Relationship between training with employee knowledge in PT. X Muncar Banyuwangi

No.	Training	Level of Fire Preparedness Knowledge						Total		ρ_s
		Low		Medium		High				
		n	%	n	%	n	%	n	%	
1.	Ever	1	8,3	7	58,3	4	33,3	12	100	0,350
2.	Never	38	48,7	37	47,4	3	3,8	78	100	

Table 2 show that respondents who claimed to have received fire prevention training with medium knowledge level as much as 7 respondents with percentage (58,3%) whereas respondents who stated never received fire prevention training with medium knowledge level 38 respondents with percentage (48,7) %). From the table can be concluded that the relationship between fire prevention training with the level of knowledge of employees at PT. X Muncar banyuwangi has a moderate relationship because employees who have never conducted fire training have medium knowledge level.

Table 3. Relationship between the working period with the knowledge of employees in PT. X Muncar Banyuwangi

No.	Work Duration	Level of Fire Preparedness Readiness Knowledge						Total		ρ_s
		Low		Medium		High				
		N	%	n	%	n	%	N	%	
1.	1-5 years old	35	55,6	27	42,9	1	1,6	63	100	0,089
2.	6-10 years old	3	25	7	58,3	2	16,7	12	100	
3.	11-20 years old	2	25	3	37,5	3	37,5	8	100	
4.	>20 years old	1	14,3	1	14,3	5	71,4	7	100	

Table 3 shows that the employment period of 1-5 years and 6-10 years turned out 35 people have a percentage (55.6%) have low knowledge and 7 people with percentage (58.3%) have moderate level of knowledge, the working period of 11-20 years it turns out that 3 people have a percentage (37.5%) with medium and high knowledge have the same number and service life> 20 years turns 5 people with percentage (71,4%) have high knowledge level. From the table can be concluded that the relationship between the working period of respondents with the level of knowledge in the preparedness of fire prevention in PT. X has a weak relationship because the longer one's working period the knowledge level is good.

Table 4. Relationship between socialization and implementation of fire prevention procedures and preparedness with knowledge of employees at PT. X Muncar Banyuwangi

No.	Socialization and Application of Fire Preparedness Readiness	Level of Fire Preparedness Readiness Knowledge						Total		ρ_s
		Low		Medium		High				
		n	%	N	%	n	%	n	%	
1.	Yes	4	13,3	20	66,7	6	20	30	100	0,462
2.	No	34	56,7	25	41,7	1	1,7	60	100	

Table 4 indicates that once done the cosisalisasi and the application of procedures and readiness of fire prevention was 20 people have percentage (66,7%) with medium knowledge level and employee who claimed has never done sosisalisasi and application of procedure and readiness of fire prevention turns out 34 people have percentage (56 , 7%) with low knowledge level. From the table can be concluded that the relationship between socialization and application of fire prevention procedures and readiness with knowledge of employees at PT. X Muncar Banyuwangi has a moderate relationship because employees who have received socialization have a moderate level of knowledge.

DISCUSSION

a. The relationship between age and employee knowledge in PT. X Muncar Banyuwangi

The results of this study indicate that age with knowledge level has a weak relationship because the older age of employees eat the better the level of knowledge. The existence of relationship between age with employee knowledge about fire prevention preparedness at PT. X MuncarBanyuwangi, because most of the employees who work in the fish canning production is the male sex numbered 82 people and most respondents have high knowledge with age> 45 years. This may be because older ages tend to have more interest or commitment to understanding fire threats than younger ones. Based on the Decree of the Minister of Manpower of the Republic of Indonesia Number KEP.186 / MEN / 1999 on Fire Response Unit in the Workplace[2] Article 8 paragraph 2, stipulates that to be appointed as fire fighting team must meet the requirements of physical health, minimum age 25 years and maximum 45 years, have a minimum of high school education and have attended basic fire fighting technique course II (Package D).

b. The relationship between training and employee knowledge at PT. X Muncar Banyuwangi

The results of this study indicate that the relationship between fire prevention training training of employees at PT. X Muncar banyuwangi has a moderate relationship because employees who have never conducted fire training have medium knowledge level. The results of this study is explained that most respondents have not been given training and fire simulation that should the management of PT. X MuncarBanyuwangi provide training to its employees about fire training that is given such as the use of APAR, fire extinguisher using APAR and evaluate every room in PT. X Muncar Banyuwangi. This means that if management has provided training to employees who work in PT. X whether implemented in the workplace or held by the city government of Banyuwangi, the hope is there is an increase of knowledge and skills to employees of PT. X in the handling of disasters and fires at PT. X Muncar Banyuwangi. Education and training for employees working in fish canning production is not selected on the basis of experience but is shaped and nurtured through training programs that include theoretical education, physical training, fire fighting practices[7]. Based on Per Men PU no. 20 / PRT / M / 2009 Concerning Technical Provisions for Urban Fire Management[6] that fire education and training should be held at least once in 6 months.

C. The relationship between the working period and the knowledge of employees in PT. X Muncar Banyuwangi The results of this study indicate that the relationship between the working period of respondents with the level of knowledge in the preparedness of fire prevention in PT. X has a weak relationship because the longer one's working period the knowledge level is good. Employees who have a working period of 1-5 years have a low knowledge of the possibility at the working period of 1-5 years is a lot of employees who graduated from elementary school so that knowledge of the preparedness of fire hazard management do not understand, bathed by the working period> 20 years most employees have high knowledge, most likely high school graduates where in the working group> 20 years of respondents this is a productive age group where they are more active and easy to access information through mass media or internet than those who have a working period 1-5 years who tend to have a sense of responsibility is less and tend to be less lazy and less curiosity and lazy to find the latest information about emergency response of fire hazard. In addition, employees with a working period of> 20 years are likely to have been trained in previous workplace fire hazards as well as those run by government agencies. Working period is one of the factors in labor characteristics that make up behavior4. The longer the work period will make the workforce more familiar with the workplace environment conditions and the fire hazards that exist in the workplace. Knowledge can increase because of

the experiences gained in life5, in which case experience is gained from the length of the person's labor. d. The relationship between socialization and implementation of fire prevention procedures and preparedness with knowledge of employees at PT. X Muncar Banyuwangi The results of this study indicate that the relationship between socialization and application of fire prevention procedures and readiness to the knowledge of employees at PT. X Muncar Banyuwangi has a moderate relationship because employees who never get socialization have low knowledge level. The result of the research is explained that most of respondents stated that there has never been socialization and application of fire preparedness prevention procedures of PT. X Muncar Banyuwangi. From the results of interviews with the management and employees stated there has been no socialization about the preparedness of fire prevention and document review also stated PT. X Muncar Banyuwangi does not have a fire preparedness preparedness procedure in all rooms so what if there is fire the employees will be less responsive to fire and the company will suffer big losses. Education and training for firefighters are not selected on the basis of experience but are shaped and nurtured through training programs that include theoretical education, physical training, firefighting practices with a view to improving the quality and capability of both the fire prevention field and in performing the tasks in accordance with their function fire management organizations, enhancing theoretical, conceptual, moral and technical skills of job implementation7. The higher a person's education the better his knowledge5.Top of Form

c. The relationship between the working period and the knowledge of employees in PT. X Muncar Banyuwangi

The results of this study indicate that the relationship between the working period of respondents with the level of knowledge in the preparedness of fire prevention in PT. X has a weak relationship because the longer one's working period the knowledge level is good. Employees who have a working period of 1-5 years have a low knowledge of the possibility at the working period of 1-5 years is a lot of employees who graduated from elementary school so that knowledge of the preparedness of fire hazard management do not understand, bathed by the working period> 20 years most employees have high knowledge, most likely high school graduates where in the working group> 20 years of respondents this is a productive age group where they are more active and easy to access information through mass media or internet than those who have a working period 1-5 years who tend to have a sense of responsibility is less and tend to be less lazy and less curiosity and lazy to find the latest information about emergency response of fire hazard. In addition, employees with a working period of> 20 years are likely to have been trained in previous workplace fire hazards as well as those run by government agencies.. Knowledge can increase because of the experiences gained in life5, in which case experience is gained from the length of the person's labor.

d. The relationship between socialization and implementation of fire prevention procedures and preparedness with knowledge of employees at PT. X Muncar Banyuwangi

The results of this study indicate that the relationship between socialization and application of fire prevention procedures and readiness to the knowledge of employees at PT. X Muncar Banyuwangi has a moderate relationship because employees who never get socialization have low knowledge level. From the results of interviews with the management and employees stated there has been no socialization about the preparedness of fire prevention and document review also stated PT. X Muncar Banyuwangi does not have a fire preparedness preparedness procedure in all rooms so what if there is fire the employees will be less responsive to fire and the company will suffer big losses. Education and training for firefighters are not selected on the basis of experience but are shaped and nurtured through training programs that include theoretical education, physical training, firefighting practices with a view to improving the quality and capability of both the fire prevention field and in performing the tasks in accordance with their function fire management organizations, enhancing theoretical, conceptual, moral and technical skills of job implementation[7].

CONCLUSION

1. Organization of fire prevention has not been established, fire prevention team has not been established, preparedness handling guidelines have not been prepared, and Human resources K3 not yet available so that not yet fulfill the requirement of Decree of Minister of Manpower RI No. 186 / MEN / 1999

2. Active and passive fire equipment infrastructure equipment

   a. Active infrastructure facilities Active fire protection system in building building in production area of PT. X Muncar Banyuwangi not good because there are some components that have not met the standard. In alarm, detector, sprinkler, hydrant still not available at PT. X Muncar Banyuwangi. In the APAR component only the label component of the officer's name performing maintenance on the APAR card or label is not yet available, and there are some rusty and less well-maintained APARs,

   b. Passive infrastructure facilities Passive fire protection system in PT. X Muncar Banyuwangi not yet suitable that is not available fire resistant door.

3. The relationship between age and knowledge of employees in the production unit at PT. X Muncar Banyuwangi has a weak relationship because the older the age of employees the better the level of knowledge.

4. The relationship between training and employee knowledge in the production unit at PT. X Muncar Banyuwangi has a moderate relationship because employees who have never conducted fire training have low knowledge level.

5. The relationship between the working period of respondents with the level of knowledge in the preparedness of fire prevention in PT. X has a weak relationship because the longer one's working life the better the level of knowledge.

6. Relationship between socialization and application of fire prevention procedures and readiness with employee knowledge in PT. X Muncar Banyuwangi has a moderate relationship because employees who never get socialization have low knowledge level.

Conflict of Interest: None

Source of Funding: Self

Ethical Clearance: The research proposal has been approved by Health Research Ethical Commission of Public Health Faculty Airlangga University. All respondents were given explanation and information about the purposes and methods of the research, and also had signed informed consent forms.

REFERENCES

1. BadanStandarNasional Indonesia. (2000). SNI 03-3989-2000 tentang Tata Cara Perencanaandan Pemasangan Sistem Sprinkler OtomatikuntukPencegahanBahayaKebakaranpada Bangunan Gedung. Jakarta: BadanStandar Nasional Indonesia.
2. KeputusanMenteri TenagaKerja No.Kep-186/ MEN/ 1999 Tahun 1999. Tentang Unit Penanggulangan Kebakaran di TempatKerja. 2011. HimpunanPeraturanPerundang-Undangan Keselamatandan KesehatanKerja. Jakarta: Kemenakertrans RI.
3. National Fire Protection Association, (2010). NFPA 10 Standard for Portable Fire Extinguishers. USA: NFPA
4. Notoatmodjo, S. (2007). Kesehatan MasyarakatIlmudan Seni. Jakarta : RinekaCipta
5. Notoatmodjo S., (2010). Metodologi Penelitian Kesehatan. Ed. Revisi, Rineka Cipta. Jakarta.
6. Permen PU. (2008). Peraturan Menteri Pekerjaan Umum Nomor 26/PRT/M/2008 tentangPersyaratan Teknis Sistem Proteksi Kebakaran Pada Bangunan Gedung Dan Lingkungan. Jakarta: BadanPenerbit PU.
7. Suma'mur, (1989). Keselamatan Kerjadan Pencegahan Kecelakaan. Jakarta: CV Haji Masagung.
8. Ramli S., (2010). Petunjuk Praktis Manajemen Bencana (Fire Manajement) Seri ManajemenK3 : Dian Rakyat. Jakarta.

Association between Exclusive Breastfeeding with Health Belief Model in Working Mothers

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ABSTRACT

Exclusive breastfeeding is important thing to do from the mother to the baby since it could decrease infant mortality rate. Exclusive breastfeeding on work place has been arranged in Indonesian Government Regulation No. 33/ 2012. Though the company has provided dedicated room for lactation as supporting factor to the achievement of exclusive breastfeeding, yet it only reach 14.25%. This research has objective to find out factors related with exclusive breast feeding practice by Health Belief Model theory. The research is conducted with cross sectional design. Sample size is 78 working women having baby ages 6-12 months. The sample is obtained by simple random sampling technique. The analysis of data correlation is processed by chi square test (α=0,05) and logistic regression. Research result showed that perception (p=0,036), parity (p=0,018), knowledge (p=0,017), socio culture (p=0,016), family support (p=0,006), direct superior support (p=0,013), and nanny role (p=0,045) in the relation of exclusive breastfeeding practice on working mother at Garment Company "X". Result of logistic regression indicate direct superior support is the most influenced variable. Low practice of exclusive breast feeding on working mother at Garment Company "X" is influenced by direct superior support factor. Also the factor of perception, parity, knowledge, socio culture, family support and nanny role.

Keywords *: working, mother, lactation, exclusive, breastfeeding*

INTRODUCTION

Based on Indonesia Demography and Health Survey (IDHS) in 2012 indicate infant mortality rate (IMR) is 32 per 1000 life birth. This is quite far from 2015 target which is 23 per 1000 birth life. One effort to decrease the IMR is by exclusive breast feeding. Exclusive breast feeding means giving breast milk to the baby for first six month of life without additional food or other liquid. The percentage of exclusive breast feeding in Indonesia in 2013 is 54.34%, in 2014 it is increased to 60%. And still, far from the target 80%.[1]

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The government has tried to increase exclusive breast feeding. One of the effort is through health regulation number 33 year 2012. In the regulation mentions that every work place is obligated to provide lactation room. The garment X company has provided it as regulated yet the number of working mother giving exclusive breast feeding is still low, which is only 14.25%.

Rahmawati, research result mentioned that job is one of the reason of exclusive breast feeding failure. The 8 hours work hours become the reason of low intensity of mother-baby meet. Indeed, there has been a 3 ministries joint regulations issued by Ministriy of Women Empowerment and Children Protection (48/MEN.PP/XII/2008), Ministry of Workers and Transmigration (PER.27/MEN/XII/2008) and Ministry of Health (1177/MENKES/PB/XII/2008) mentioned breast feeding during work hour at work place.[2]

Anggraeni, mentioned that there is a difference of exclusive breast feeding based on work status.[3] Research by Putri, mentioned that exclusive breast feeding on mother working in factory is less than housewife.[4] Other research by Hidayanti, found out work place support like lactation room and health attendant suggestion influence exclusive breast feeding by working mother.[5]

The Health Belief Model (HBM) theory can be used to describe behaviour determined factor. It can be used in this research since the practice of exclusive breast feeding is a matter of privacy. The HBM theory says the behavior of one is influenced by the perception or individual belief it self.[6] Therefore, this research's objective is to find out the factors influencing exclusive breast feeding by HBM theory approach.

MATERIAL AND METHOD

The research is conducted at Garment Company "X", located on Bawen, Central Java, Indonesia, in March to April 2016. This research is analitical with cross sectional study . The samples are working mother at Garment Company "X" having infant ages 6-12 months and 78 working mothers are selected by simple random sampling.The data analysis is conducted by two methods which are chi-square test or Fisher Exact Test α = 0,05) and logistic regression.

FINDING

HBM theory is the theory of the alter of health behavior and psychological model used to predict health behavior by focusing on perception and individual belief on a desease. The HBM theory is based on an understanding that someone will take any action related with health based on the perception and belief.*Chi-square test*or*fisher exact* test results are as below:

Table 1. Factors related withExclusive Breast Feeding Practice of Working Mother at Garment Company "X"

No	Variables	Cathegory	Exclusive Breast Feeding Practice						p value
			No		Yes		Number		
			f	%	f	%	f	%	
1.	Perception	Poor Good	36 30	46,2 38,5	2 10	2,6 12,8	38 40	48,7 51,3	0,036 *
2.	Parity	1 child >1 child	33 33	42,3 42,3	1 11	1,3 14,1	34 44	43,6 56,4	0,018 *
3.	Knowledge	Poor Average Good	35 26 5	44,9 33,3 6,4	1 9 2	1,3 11,5 2,6	36 35 7	46,2 44,9 9,0	0,017 *
4.	Socioculture	Negative Positive	22 44	28,2 56,4	0 12	0 15,4	22 56	28,2 71,8	0,016 **
5.	Nanny Role	Poor Good	35 31	44,9 39,7	2 10	2,6 12,8	37 41	47,4 52,6	0,045 *
6.	Family Support	Less Support Support	37 29	47,4 37,2	1 11	1,3 14,1	38 40	48,7 51,3	0,006 *
7.	Direct Superior Support	Less Support Support	52 14	66,7 17,9	5 7	6,4 9,0	57 21	73,1 26,9	0,013 **
8.	Peer Support	Less Support Support	28 38	35,9 48,7	5 7	6,4 9,0	33 45	42,3 57,7	1,000 *
9.	Education	Elementary (≤ 9 years) High School (> 9-12 years)	30 36	38,5 46,2	2 10	2,6 12,8	32 46	41,0 59,0	0,108 **

Remark :

* : *chi-square test*

** : *fisher exact test*

From table 1 can be found that p value on perception variable = 0.036, parity = 0.018, knowledge = 0.017, socio culture = 0.016, nanny role = 0.045, family support = 0.006, direct superior support 0.013, peer support = 1.000 and education = 0.108. Variables with p value < 0.05 are variables having significant relation with exclusive breast feeding practice. On the opposite, variables having p > 0.05 do not related with exclusive breast feeding practice on working mother at Garment Company "X".

Table 2. Logistic Regressionof Exclusive Breast Feeding Practice Research Variables

Variable	Wald	df	p
Education(1)	c	1	.996
Socioculture(1)	.000	1	.996
Family Support(1)	.000	1	.998
Direct Superior Support(1)	4.187	1	.041
Nanny role(1)	.000	1	.999
Constant	.067	1	.796

From Logistic Regression Analysis can be seen that direct superior support variable is the most dominant among all variables. As on table 2, Wald value of the variable is 4.187 which is the highest compare to others. Aligned with the p value 0.041 which is the smallest value compare to others.

Perception is one of the variable that related with exclusive breast feeding practice on working mother at Garment Company "X"(p = 0,036 < 0,05). Mother having poor perception regarding lactation management mostly do not do exclusive breast feeding compare to mother having good perception. Questions asked consist of vulnerable perception, seriousness, advantage, obstacle, and terms and condition to do lactation management and exclusive breast feeding. From the result can be known that respondents perception regarding vulnerability and seriousness of health problem due to do not give exclusive breast feeding obtain lower score compare to other perception. This is caused by the impacts or disadvantages occured from do not give exclusive breast feeding are indirectly visible. This result is supported by one by Fikawati, Miguel, and Pawenrusi, stated that there is significant relation between mother perception regarding exclusive breast feeding.[7,8,9] It is also aligned with HBM Theory stated that one behavior is determined by perception owned.[6]

Parity has a significant relation with exclusive breast feeding practice on working mother at Garment Company "X"(p = 0,018 <0,05). Mother having child >1 is tend to give exclusive breast feeding than mother having 1 child. The experience of breast feeding on previous birth giving influencing someone to repeat it on the next birth giving.[10] In HBM theory, parity is included in demography variable. Demography is one of the factor influencing someone perception to behave.[6] Breast feeding experience also become a terms to repeat it on next birth giving, thus it will initiate a mother to give exclusive breast feeding to the baby though she is working by doing lactation management.

Beside the perception and parity, other variable having significant relation with exclusive breast feeding is knowledge (p = 0,017 < 0,05).Most of mothers are less awared the importance of breast milk as baby main nutrition source. Mother only know about exlusive breast feeding, yet does not know and understand correctly regarding lactation management and other things that should be concerned in order to keep giving exclusive breast milk particularly on working mother.[11]

A behavior is closely related with the local culture. Research result indicates that socio culture has a significant relation with exclusive breast feeding practiceon working mother at Garment Company "X" (p = 0,016 < 0,05). Mother having negative socio culture (still rely on belief and tradition regarding breast feeding) does not give exlusive breast milk. On the opposite, mother giving exclusive breast milk is no longer rely on

belief, tradition and myth that can fail exclusive breast feeding such as giving or spreading honey on the lips of new born baby so the baby can talk earlier, giving coffee so the baby do not stiff and feeding banana so the baby gains weight and health.

Other variable having significant relation with exclusive breast feeding is nanny role (p = 0,045 < 0,05). The nanny has an important role to replace the mother during work time. Yet many of the nannies are not provide sufficient support to give exclusive breast feeding and do lactation management. The data indicates that mothers having nanny with good role tend to give exclusive breast feeding compare to them having nanny with less role.

A support is one of the factor that can motivate someone to behave. It can be obtained the environment, whether it is family or work place. Family support is significantly related with exclusive breast feeding practice on working mother at Garment Company "X"(p=0,006 < 0,05). The respondent said that the most supporting family member in lactation management are husband and mother (the baby's grandmother). Support giving can ignite mother behavior in exclusive breast feeding. It is showed by the research result. Respondents with family support tend to do lactation management and exclusive breast feeding compare to them with less family support.

Beside family support, one from direct superior also related with exclusive breast feeding practice (p = 0,013 < 0,05). The data obtained indicate that many direct superior does not give sufficient support the mother to do exclusive breast feeding . This causing many mother do not give exclusive breast milk to the baby. Mother with support tend to do exclusive breast feeding for her baby compare to them with less support from direct superior.

The tolerance and special permission for breast feeding mother to do lactation management like breast milk squeezing within working hour surely will give positive impact on exclusive breast feeding by working mother. Beside, if a sufficient facility is provided on the work place, it will be assisted working mother to do exclusive breast feeding.[11] The support from direct superior is cathegorized in sign to act in HBM theory. The support gived can motivate a mother to practice exlusive breast feeding though she is working.[6]

Yet, for peer support statistically does not related with exclusive breast feeding practice (p = 1,000 > 0,05). This result is contradictive compare with result of research by Ida and Suyes, stated that one of the factors influencing exclusive breast feeding is peer support. [12,13] Mother working outside her home will interact more with the people in the work environment. Thus the support from work peer will influence the mother decision to do exclusive breast feeding.[11] In HBM theory, peer support also become a sign to act influencing a mother to behave.

Based on the data obtained can be known that tough many work peer support, yet only few mother do exclusive breast feeding practice. This is due to the peer giving the support does not practice lactation management and experience failure in exclusive breast feeding practice. According to behavior theory stated by Bandura which is Social Learning Theory explaining that human behavior is a continuous both side interaction between cognitive, environment and behavior factors. So the behavior to do exclusive breast milk is not only influenced by cognitive factor, but also environment factor. Environment factor in this term is not just a support provided by work peer but much further is the example given by the work peer (modeling). With many case of unpracticing lactation management such as squeezed breast milk and failure to do exclusive breast feeding by friend that viewed as a model or example, are caused the respondents not to do squeezed breast milk and do not give exclusive breast feeding though they got support from their work peer.[6]

Other variable that does not related with exclusive breast feeding practice on working mother at Garment Company "X" is education (p= 0,108 >0,05). This result is aligned with Weber and Banu, stated that education does not related withexclusive breast feeding practice.[14,15] Yet vary with the research by Sholeye, stated that mother education is related with exclusive breast feeding practice.[16]

HBM theory categorize education as demography variable that able to influence perception to behave on someone.[6] But as statistical test result, obtain that there is no relation between education with breast feeding practice on working mother at Garment Company "X". This difference can be occured due to the respondent's education back ground is only reached senior high school. Beside that the information regarding breast milk does not obtained from the school, but from instantion and health attendant. So does on Theory of

Reasoned Action (TRA) which stated that one behavior is influenced by belief, attitude and will, ignoring the education background.

From all variables significantly related with exclusive breast feeding practice, the analysis result of logistic regression stated that variable of direct superior support as the most dominant variable. This is acceptable, since the respondent is the working mother. The work environment is one of the circumstance that able to influence a mother to behave. Work demand and high work load dictate the mother to complete her job. If it does not counterbalance with support from the superior to lactation management, then the mother will have large percentage to fail in exclusive breast feeding practice.

CONCLUSION

The research showed that low practice of exclusive breast feeding on working mother at Garment Company "X" Semarang, Central Java, Indonesia is influenced by some variables. Variables that related with exclusive breast feeding practice are perception, parity, knowledge, socio culture, family support, direct superior support and nanny role. While variables of education and peer support are not related with exclusive breast feeding practice on working mother at Garment Company "X". Result of logistic regression showed that direct superior support is the most dominant varible in this research.

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REFERENCES

1. Kemenkes RI. Profil Kesehatan Indonesia Tahun 2014. Jakarta:Kemenkes RI; 2015.
2. Rahmawati, Meiyana D. Faktor-Faktor Yang Mempengaruhi Pemberian ASI Eksklusif Pada Ibu Menyusui Di Kelurahan Pedalangan Kecamatan Banyumanik Kota Semarang. Jurnal KesMaDaSka.2010;1(1).
3. Anggraeni, Marisa F, dkk. Pemberian ASI Eksklusif Berdasarkan Status Bekerja Ibu yang Memiliki Bayi Usia 6-11 Bulan Di Wilayah Kerja Puskesmas Karangawen 1 Kabupaten Demak. Jurnal Kebidanan. 2015; 4: 50-56.
4. Putri, Anun IM. Hubungan Antara Pengetahuan Ibu Bekerja Tentang Manajemen Laktasi Dan Dukungan Tempat Kerja Dengan Perilaku Ibu Dalam Pemberian ASI di Wilayah Kerja Puskesmas Kartasura. Naskah Publikasi. Surakarta : Universitas Muhammadiyah Surakarta; 2013.
5. Hidayanti, Lilik, Lina N. Kontribusi Persepsi dan Motivasi Ibu dalam Meningkatkan Keberhasilan Pemberian ASI Eksklusif di Wilayah Pedesaan. Tasikmalaya : Universitas Siliwangi; 2014.
6. Priyoto. Teori sikap dan Perilaku dalam Kesehatan Dilengkapi Contoh Kuesioner. Yogyakarta: Nuha Medika; 2014.
7. Fikawati, Sandra, Syafiq A. Status Gizi Ibu dan Persepsi Ketidakcukupan ASI. Jurnal Kesehatan Masyarakat Nasional. Jun 2012; 6(6): 249-254.
8. Miguel A, et al. Prevalence and Determinants of exclusif breastfeeding among adolescent mothers from quito, equador : a cross-sectional study. International Breastfeeding Journal. 2015;10: 33.
9. Pawenrusi EP. Faktor Yang Berhubungan dengan Pemberian ASI Eksklusif Di Kelurahan Tamamaung Kota Makassar. Media Gizi Pangan. 2011;12(1).
10. Megasari, Miratu, dkk. Panduan Belajar Asuhan Kebidanan I. Yogyakarta: Deepublish; 2014.
11. Damayanti, Diana. Asyiknya Minum ASI. Jakarta: PT. Gramedia Pustaka Utama; 2013.
12. Ida. Faktor-Faktor yang Berhubungan dengan Pemberian ASI Eksklusif 6 bulan di Wilayah Kerja di Puskesmas Kemiri Muka Kota Depok Tahun 2011. Skripsi. Depok: Universitas Indonesia; 2012.
13. Suyes, Kathryn, et al. Breatfeeding in The Workplace: Other Employees' attitudestoward service for lactating mother. International Breastfeeding Journal.2008; 3:25.
14. Weber, Danielle, et al. Female employees' perceptions of organisational support for breastfeeding at

work: findings from an Australian health service workplace. International Breastfeeding jounal. 2011; 6:19.

15. Banu, Bilkis, Khursida K. Effects of Education Level of Father and Mother on Perceptions of Breastfeeding. Journal of Enam Medical College. 2012; 2(2): 67-73.
16. Sholeye, Oluafolahan O, et al. Exclusive Breastfeeding and Its Associated Factors among Mothers in Sagamu, Southwest Nigeria. Journal of Health Science. 2015; 5(2):25-31.

Availability, Accessibility, and Acceptability of Health Services in Remote Indigenous Community of the Baduy Dalam Tribe

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ABSTRACT

Background: Unequally in rights to health cause a disparity between indigenous communities and people in general, which should be avoidable. The *Baduy Dalam* tribe is one of the indigenous communities in Indonesia that refuses to follow modern developments. The *Baduy Dalam* tribe's strong obedience to their tradition bothersome health workers in delivering modern health services. Availability, accessibility, and acceptability of health services as a base of health service concept and rights to health need to be further analyzed in the *Baduy Dalam* tribe.

Method: This qualitative research uses a Basic Human Rights paradigm approach to obtain in-depth information regarding health services among the *Baduy* community. The method used was in-depth interviews, and informants were chosen using a purposive technique to achieve correct and adequate information for this research. Results were analyzed using a matrix and content analysis to identify the thematic information. To maintain validity, document review and literature review on the subject were conducted.

Results: Utilization of available healthcare facility majorly affected by community acceptance. Mobile health services can't be conducted without the community leader's permit and acceptance. There's an urgent need to do strategic approach to increase the community acceptance using sensitive cultural approach. Attention and effort from multi-sectoral governments are very low.

Conclusions: Healthcare services to the *Baduy Dalam* community is not performed well as there are various obstacles in the availability, accessibility, and acceptability of modern healthcare services in The *Baduy Dalam* community.

Keywords: *Primary Healthcare services; indigenous communities; availability; accessibility; acceptability*

INTRODUCTION

There are approximately 370 million indigenous communities spread across 90 countries around the world. The total population of indigenous communities makes up 5% of the world population.[1] In Indonesia there are 231,268 families in remote indigenous communities. A regulation from the Indonesian government defines remote indigenous communities as a group of individuals attached as a unit, geographically, economically, and/or by social culture, and poor, remote, and/or fragile social economy.[2] On the other hand, the UN categorizes indigenous community such as a group of people with their own social structures such as pre-colonial communities, those who profess to being an indigenous community, have strong ties to an area or the surrounding environment, form a minority, have specific culture and language, and protects the culture of the ancestors.[3]

Currently, indigenous communities in developing and in developed countries are a marginal group with minimal access to basic healthcare and poor health

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conditions compared to the general population.[4] As well as traditional knowledge and sustainable practices that are invaluable resources for human development. However, indigenous people remain on the margins of society in high, middle and low-income countries, and they bear a disproportionate burden of poverty, disease, and mortality compared to the general population. These inequalities have persisted, and in some countries have even worsened, despite the overall improvements in health indicators in relation to the 15-year push to meet the Millennium Development Goals. As we enter the Sustainable Development Goals (SDGs Indigenous communities are located far away from basic healthcare services, placing them at higher health risks to reach healthcare facilities in time of urgent need. Moreover, unreachable modern healthcare services put them in a condition where traditional medicine is their only alternative to cure their illnesses.[5]

Unequal health status between the indigenous communities and the general population is an unacceptable condition because it can be prevented by government's policy. This condition is a matter of concern to healthcare service providers in all countries as they have responsible in providing equal services for all. Provision of equal healthcare services to indigenous communities to fulfill their rights to healthcare is part of providing their basic human rights.[6] Availability, accessibility, and acceptability are three components that have strong connections and are the bases for providing rights to healthcare. In addition, they are often used in various healthcare research for susceptible communities such as the disabled communities, indigenous communities, and other minority groups as they focus on equal healthcare rights and reflect a balance between characteristics and expectation of healthcare providers and receivers.[6–8]

There is an indigenous community in Indonesia that refuses to live using technology and limits themselves from the changing modern society, it is the *Baduy* Tribe which divided into two – *Baduy Luar* (outer *Baduy*); and *Baduy Dalam* (inner *Baduy*). The difference is that *Baduy Luar* has been exposed to modern lifestyle, whereas the *Baduy Dalam* still follows a traditional lifestyle such as not using electricity, electronic devices, and vehicles. Till today, the *Baduy Dalam* travel by foot even though they need to travel far distances.[9]

The *Baduy Dalam* Community is known for their determination to follow traditions. There are traditional laws, "*lojor teu meunang dipotong, pondok teu meunang disambung"* which translates to "long cannot be cut and short may not be joined". This means that all things may not be added or removed. That law has become a consideration of healthcare personnel in delivering services to the community.[11,12]

In several studies about availability of healthcare service in indigenous communities recommend to provide services that incorporate the community perspectives on modern medicine and adjusted to their condition which would then increase its acceptance by the community.[5,13] Based on Ipa (2014), healthcare services for the *Baduy Dalam* community should not be provided using the same model for other general communities. Adjustments to certain characteristics and conditions of the *Baduy Dalam* community are needed so they may be used and accessed healthcare services. As a country with big cultural diversity, Indonesia government has a lot of things to be considered to make health services equitable. Further analysis is required to identify the condition of health service for *Baduy Dalam* community using health rights paradigm from the availability, accessibility, and acceptability aspects.

METHOD

This is a qualitative study aimed at obtaining in-depth information on the provision of healthcare services to the *Baduy Dalam* community. Information was obtained by in-depth interview using in-depth interview guide. Respondents chosen by purposive technique were 1 representative from Lebak District Health Department, Head of Cisimeut CPHC, a nurse from Cisimeut CPHC, a Midwife coordinator at Cisimeut CPHC and as a pioneer of modern healthcare services for *Baduy* Tribe (*Baduy Luar* dan *Baduy Dalam*), Kanekes Village Midwife. Two healthcare personnels (a nurse and a midwife coordinator) from Cirinten CPHC were chosen because of its location near the *Baduy Dalam*'s exit gate in Cijahe and also they have close relation and good information about *Baduy Dalam* Tribe. Another respondent chosen by snow ball techniques were Kanekes Village Officer, three Kanekes Village Health Cadres, two persons from two humanitarian non-government organization, and three persons from inside and out *Baduy Dalam* Community. The interviews were written in the form of a transcript then simplified into a matrix. Thematic content analysis was performed to

obtain in-depth information regarding the availability, accessibility, and acceptability of healthcare services by *Baduy Dalam* community. To maintain data validity, data and information obtained from informants were compared, and document review and literature review of associated topics were performed.

RESULTS

Availability

All approach to make health service available for the tribe, such as mobile health service, additional health workers, and a transit-birth house didn't go well because of community's acceptance and healthcare workers' skill in approaching the community.

Cisimeut CPHC doesn't have special approach or strategy to build good relationship with the community and they feel helpless in delivering health services to the community. The Health Department in Lebak District already give all authority to Cisimeut CPHC to deliver health service, but their attention to monitor and evaluate how health services delivered to *Baduy Dalam* community is very low. Without intensive attention, help, and supervision from The Health Department district, Cisimeut CPHC performance will be the same. Even healthcare service is available for the *Baduy Dalam* tribe, leader's permit and community's belief play a major role on acceptability of modern healthcare services.

Even the health service was available and adapted to indigenous' characteristic, birthing house which built by Constitution of Mexico wasn't utilized by their indigenous community. Constitution of Mexico was built traditional birthing house where traditional birth attendance can help indigenous mother under supervision of professional birth attendance. But, the house wasn't utilize by their indigenous community because of indigenous' trust and comfort issues so the indigenous community prefer to deliver their babies in their own house.[14] Before provide a health service for indigenous, it's important to maintain a good relation and trust between health provider and indigenous community. Without indigenous community acceptance, available health service won't utilize well.

Accessibility

Communication as an important aspect in health access also have big influence in delivering healthcare services. Interviewed healthcare personnel said that they have difficulty in communicating with the *Baduy Dalam* community. It's not caused by the language, but it is because the *Baduy Dalam* community have different perspective about health and have low understanding about their own compliant and health needs which always confused the healthcare personnel as stated below.

"Communicating with them is very… very hard… we have to bring someone who have close relation with them such health cadres from The Baduy Luar community, so they will feel ease to communicate with us" (KP)

"when they visited me, they just sat… stayed quiet and and didn't say anything. Just quiet. So at the moment, I knew that I have to be very proactive in communicating with them, ask them why and what they want… sometimes after I asked them, they hardly to communicate what they want because of their lack understanding about their own health condition…" (BD-3)

With poor health seeking behavior of The *Baduy Dalam* community, the healthcare personnel shouldn't have to wait passively until The *Baduy Dalam* community come and ask for help. To reach the *Baduy Dalam* area, walk by foot is the only way that healthcare personnel can do. the travel time into The *Baduy Dalam* area from Cisimeut CPHC is about 3-4 hours by walk. Even the distance between Cisimeut CPHC and the *Baduy Dalam* area is about 8 Km, the healthcare personnel must pass a small pathway through hills and valleys. Besides that, the *Baduy Dalam* community mostly work in their field located far from *Baduy Dalam* area. That condition makes the healthcare personnel difficult to meet them, especially when they have to conducted a sweeping activity to do an examination and treatment for neglected disease such Yaws which still exist in the *Baduy* tribe.

Some informants were said even the *Baduy Dalam*'s priority to treat their illness were using traditional medicine and spiritual ceremony, few people from the community needs help from healthcare personnel. They started to need help from healthcare personnel because traditional medicine they always use didn't heal their illness. Some informants were said that they are afraid to go to health clinic or CPHC because they don't have enough money to pay the bills. The village officer said majority of the *Baduy Dalam* community haven't

covered from national health insurance. The Village officer said it was a dilemma for them to registered all the Kanekes Village citizen categorized as a poor and in need of National Healthcare Insurance so they can access healthcare service freely because it will raise poverty degree and cause another trouble in the village. Also, there's no specific regulation to protect the indigenous community from *out-of-pocket* health expense. Lack of attention and poor coordination between governments blocking community's opportunity to improve their life quality and it could be assumed as right to health violation that happen systematically.

One of the indigenous in Indonesia, *Orang Rimba* Tribe, live nomadic inside South Sumatera Forest had accept modern health service. The head of District Health Departments was working with other sectors to deliver regular healthcare services. Cultural approach as their main strategy results in good relationships between the government, healthcare personnel, and The *Orang Rimba* tribe while increase the tribe's health degree. Without direct support, synergy, and involvement of multi-departments, healthcare service innovation for indigenous community will not have a good impact.[16]

Acceptability

Acceptability of healthcare services is a combination of value as reflected by someone's ability to accept the services based on perception, experience, and response towards the services and highly associated with the social culture of an individual.[17] The *Baduy Dalam* community known with their strong obedience to their culture and their leader's decisions. Based on in-depth interview, respondent from non-government organization said if there's something emergency cases related to health, the community couldn't make decision by themselves, they have to ask the leader's solution. If the community leader decides something that not in line with medical treatment, the community will still follow the leader's decision even it can threaten their life.

From in-depth interview, birthing assistance by professional healthcare is forbidden for the community. The women have to give birth without any assistance and traditional healer should come after the baby was born to cut the placenta. The community believe that blood released during childbirth can cause a disease especially for kids and men. But in 2000, one of the *Baduy* tribe leaders requested a village midwife to assist his daughter. Because of the distances, the baby was already born when she arrived. After that, there's no request from the *Baduy Dalam* community to the midwife village.

Other restrictions related to modern healthcare are using family planning, immunization, antenatal care and postnatal care. For the community, family planning regarded as an act of refusal god's blessed and contrary to the culture their belief.[11,18] The healthcare personnel said that the community believe that immunization doesn't prevent a disease but instead bring a new disease for healthy body. The community have a restriction on the use tools made of metals. That's why they refuse medication through injection.

Lack of culturally sensitive approach from healthcare personnel, make healthcare services remain strange and taboo for the *Baduy Dalam* community. One of the informants said, if there's any regular mobile healthcare services conducted in the *Baduy Dalam* area, although the healthcare services are just basic examination such as weighting and height measurement, these things will be considered as a threat and can contaminate the purity of their culture. Lack of healthcare personnel understanding about the community's culture had increase the community's discomfort. Discrimination and bullying experience brought by healthcare personnel lack knowledge about indigenous culture could increase indigenous refusal of modern healthcare services and widens communication gap between healthcare personnel and indigenous community. In New Zealand, cultural safety approach was developed and trusted as an innovation to minimize communication gap between healthcare personnel with indigenous community.[19,20]

CONCLUSIONS

Healthcare services for the *Baduy Dalam* community mostly affected by their acceptance on modern healthcare services. Even though the healthcare services are available, it will not be utilized well when the community has low acceptance. Healthcare service access such communication, distances, and protection from financial hardship is in complicated condition and need a lot of attention from multi-sectoral governments. Before providing available healthcare service that also accessible for the community, the governments must do strategic safety cultural approach to increase community's acceptability.

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REFERENCES

1. World Bank. Indigenous People, http://www.worldbank.org/en/topic/indigenouspeoples (2017, accessed 8 April 2018).
2. Menteri Hukum dan Hak Asasi Manusia Republik Indonesia. Peraturan Presiden Republik Indonesia Nomor 186 Tahun 2014 Tentang Pemberdayaan Sosial Terhadap Komunitas Adat Terpencil. 186, Indonesia, 2014.
3. United Nations. Who are indigenous peoples? United Nations Permanent Forum on Indigenous Issues. Indig Peoples, Indig Voices 2015; 1–3.
4. Hernández A, Ruano AL, Marchal B, et al. Engaging with complexity to improve the health of indigenous people: a call for the use of systems thinking to tackle health inequity. Int J Equity Health 2017; 16: 26.
5. Gibson O, Lisy K, Davy C, et al. Enablers and barriers to the implementation of primary health care interventions for Indigenous people with chronic diseases: A systematic review. Implement Sci 2015; 10: 1–11.
6. UN Economic and Social Council. General Comment No. 14: The Right to the Highest Attainable Standard of Health (Art. 12 of the Covenant). UN Comm Econ Soc Cult Rights 2000; 2000: 2,7,19.
7. World Health Organization. ALMA-ATA 1978 Primary Health Care. Int Conf Prim Heal Care 1978; 63.
8. WHO. Human rights and health, http://www.who.int/news-room/fact-sheets/detail/human-rights-and-health (2017, accessed 22 June 2018).
9. Zid M, Hardi OS, Falah H, et al. Interaksi dan Perubahan Sosial Masyarakat Baduy di Era Modern. 2017; 14–24.
10. WHO. WHO | What do we mean by availability, accessibility, acceptability and quality (AAAQ) of the health workforce? WHO, http://www.who.int/workforcealliance/media/qa/04/en/ (2014, accessed 13 June 2018).
11. Ipa M, Prasetyo DA, Arifin J, et al. Balutan Pikukuh Persalinan Baduy: Etnik Inner-Baduy - Kabupaten Lebak. Jakarta: Lembaga Penerbitan Balitbangkes, 2014.
12. Silahudin A. Penyebaran inovasi keluarga berencana untuk kesejahteraan dan kesehatan pada Komunitas Adat Terpencil Baduy di Kabupaten Lebak Banten. 2016; 1–24.
13. Li J-L. Cultural barriers lead to inequitable healthcare access for aboriginal Australians and Torres Strait Islanders. Chinese Nurs Res 2017; 4: 207–210.
14. Tucker K, Ochoa H, Garcia R, et al. The acceptability and feasibility of an intercultural birth center in the highlands of Chiapas, Mexico. BMC Pregnancy Childbirth 2013; 13: 94.
15. Kementrian Kesehatan RI. Undang-Undang Republik Indonesia No. 36 Tahun 2009 Tentang Kesehatan. 2009; 111.
16. ROKOM. Pembinaan dan Pelayanan Kesehatan pada Komunitas Adat Terpencil Suku Anak Dalam melalui Team Mobile - Sehat Negeriku, http://sehatnegeriku.kemkes.go.id/baca/daerah/20170529/5221239/pembinaan-dan-pelayanan-kesehatan-komunitas-adat-terpencil-suku-anak-melalui-team-mobile-2/ (2017, accessed 12 June 2018).
17. Anderson I, Robson B, Connolly M, et al. Indigenous and tribal peoples' health (The Lancet–Lowitja Institute Global Collaboration): a population study. Lancet 2016; 388: 131–157.
18. Ipa M, Prasetyo DA. Praktik Budaya Perawatan Dalam Kehamilan Persalinan Dan Nifas Pada Etnik Inner-Baduy. J Kesehat Reproduksi; 7. Epub ahead of print 2016. DOI: 10.22435/kespro.

v7i1.5097.25-36.

19. Giles AR, Darroch FE. The need for culturally safe physical activity promotion and programs. Can J Public Heal 2014; 105: 317–320.

20. Aniza I, Norhayati MY. Barriers to health promotion for indigenous communities: Lessons for Malaysia. Malaysian J Public Heal Med 2016; 16: 6–14.

The Effectiveness of Applying Score System in Growth Chart to Predict Stunting and Improve Nutritional Knowledge of Pre-Schoolers' Mother in Indonesia.

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ABSTRACT

Background: A growth chart is widely used to monitor child growth, but not to predict stunting. Therefore, there is a high need to create a more simple growth chart. The study aimed to find out the effectiveness of the application score system in growth chart in predicting stunting and improving mothers knowledge.

Materials and Method: This study was a quasi experimental study. A total of 533 pre-schoolers aged 4-5 years old and 110 mothers were selected from forty kindergarten schools in Deli Serdang and Aceh Besar Distric. Twelve field workers were trained to conduct height measurements using the score growth chart and teaching mothers on nutrition. Data on height status was presented in six classifications. Chi-Square test was performed to test the difference of mother's knowledge before and after intervention.

Findings: Of the total 533 pre-schoolers, 22.5% were stunted and 33.1% children had been predicted to be stunted. After intervention, mothers in the intervention group were three and half times more likely to have better knowledge than mothers in the control group (85.2% vs 56.6%) and Relative Risk : 3.5 (1.5-6.5)

Conclusions: Application of the score system in growth chart was practicable in predicting stunting and improving maternal knowledge. It needs to consider applying the wall score growth chart in nutritional survey. Children under-five year old need to involve in further studies.

Keywords: *Score system, Growth Chart, Stunting, Pre-schooler, Nutritional Knowledge*

BACKGROUND

Stunting is defined low-length-or height-for-age below two of standard deviation of the World Health Organization standard . [1] Globally, the prevalence of stunting prevalence is improving. It has resulted in being an identified as a major global health priority.[2] In sub-Saharan countries have the higher prevalence than Southeast Asian countries, 40% and <30%. [3] WHO reported that since 1996-2010 there was not meaningful decreasing of stunted children all over the developing countries.[4] In Indonesia, since 2007 until 2013 the stunting prevalence has remained stagnant at 35.0% to 37.0%. It is because children with height for age between <-2 to -1 standard deviation were not targeted in the nutrition intervention program. Meanwhile, WHO stated that stunting prevalence has to decrease < 20.0%. [5,6]

A growth chart is widely used as a nutrition education tool for parents to monitor their child growth including to detect stunting. However, most mothers found it difficult to interpret the child growth on the chart. Roberfroid found that 40%-70% mothers in Asia, Africa and Latin America had low understanding in interpreting their child growth.[7,8] In Indonesia, not more than 34.0% mothers understood the function growth chart. [9] Therefore, there is a high need to create a more simple and communicative growth chart to be easily understood by parents.[10] Recently, more than 200 kinds of modifying growth charts created in eighty countries [11,12] to allow parents have a better understanding of

early growth patterns. Several studies had found that good understanding of growth chart was effectively decreasing stunting.[13,14]

In this study, we used score growth chart as the main media to detect and predict stunting and in teaching mothers on child nutrition. Scores 5, 6, 7, 8, 9 and 10 were applied in interpreting the nutritional status of children. This modified growth chart had been tested and resulted high sensitivity (91.0%) and specificity (92.0%).[15]

The ideas of applying numbers emerged from several public health studies that applied percents and scores in motivating clients to do positive activities. [16-18] This study aimed to find out the effectiveness of score growth chart to predict stunting and improve mothers nutritional knowledge.

MATERIAL AND METHOD

Study Design

This study was a quasi experimental study conducted in twenty kindergarten schools in urban areas of two districts that purposefully selected from two provinces; ten schools in Deli Serdang of North Sumatera Province as intervention location and ten schools in Aceh Besar of Aceh Province as control study. The prevalence of stunting in Deli Serdang and Aceh Besar was comparable, 24.4% and 26.4%, respectively. [19,20]

Participants

a. Preschoolers

A total of 533 pre-schoolers aged 4-5 years old were selected from forty kindergarten schools; 265 children in Deli Serdang and 268 students in Aceh Besar. Selection of schools based on the number of students, school performance, the ratio of teacher and student and school health program.

b. Mothers

The number of mothers were determined by sample size calculation. We calculated the sample size keeping in view, there would be a 30% improvement of nutritional knowledge after intervention and adding 10% for drop-out possibility, using this formula; [21]

Materials

Score Wall Growth Chart

Score growth chart is a modified growth chart. It is made from a thick plastic material with the size 150 cm x 200 cm. The horizontal lines show the height in cm (0-130 cm) and vertical lines show the child's age in months. Score 5, 6, 7, 8, 9 and 10 are placed on the left side.

These scores imply six classifications of height status: 1) Score 5 (HAZ <-3SD) = Severely Stunting. 2) Score 6 (HAZ ≤-3 to -2SD) = Stunting, 3) Score 7 (HAZ ≤-2 to -1 SD) = Tend to be Stunting. 4) Score 8 = Normal (HAZ 0 to +1SD), 5) Score 9 (HAZ +1 to +2SD) = Tall and 6) Score 10 (HAZ +2 to +3SD) = Very Tall.

Taking height measurement

The measurements were taken individually and collectively.See fig.1 and 2. Prior to taking the measurement, child's age had to put into groups. Measurement was started by positioning the child in front of the wall chart, calculated the height and determine nutritional status. The mother was asked to observe and to record child height and status.

Data collection

There were four steps data collection implemented in this study. Step one was collecting data on the height measurement of 533 pre-schoolers in forty kindergarten schools. Three field workers were responsible to take the measurements. Data on child height, scores and nutritional status of each child were recorded by enumerators. Step two was collecting data on respondents' economic characteristics and nutritional knowledge. A pretested structured questionnaire was administered to obtain information on socioeconomic profile, child age, weight, length and sex, parents education and occupation. Step three was conducting a nutrition education class. Mothers in the intervention group were taught on child growth and healthy food. Mothers were presented with five topics; 1) Function of the growth chart 2) Function of scores 3) Normal height gain 4) Interpreting growth scores 5) nutrition status. While in mothers control group were encouraged to weigh their children regularly and providing healthy breakfast and step four was re-collecting data on mother's knowledge.

Data Analysis

Data on height status of 533 pre-schoolers was presented was presented in distribution frequency table. Based on the mean scores of twenty questions used to categorize the level of knowledge. It was divided into two categories; high knowledge and low knowledge. Statistical calculation used was T-test and Chi-Square test. The significance level was determined by the *p*-values.

RESULTS

Table 1. Sosioeconomic characteristics of respondents, by location of study

	Deli Serdang, n=265		Aceh Besar, n=268		
Socio-economic charactristics	**n(%)**	**Mean±SD**	**n(%)**	**Mean±SD**	***p*-value**
Children characteristics					
Sexual types	121(45.7)		129(48.3)		> 0.05
Boy	144(54.3)	3.2±0.38	139(51.7)	3.2±0.45	> 0.05
Girl		48.2±1.9		48.0±1.6	> 0.05
Birth weight (kg)	95(35.9)		105 (39.3)		
Birth length (cm)	170(64.1)		163 (60.7)		
Current age (months)					
48-54 months					
55-60 months					
Parent's characteristics					
Mother's age (years)		26.8±4.44		28.9±4.59	0.73
Father's age (years)		152.3±3.44		151,6±4.44	0.78
			30(11.2)		
Mother's education	25(9.4)		63(23.8)		
Grade 1-6	75(28.3)		140(52.9)		0.79
Grade 7-9	137(51.4)		35(13.1)		
Grade 10-12	28(10.9)				
Grade >12					
Mother's occupation					
Household workers	197(74.3)		179(66.8)		0.37
Government workers	32(12.0)		43(16.0)		
Agricultural/skill labour	24(9.1)		28(10.4)		
Private sector	12(4.6)		18(6.7)		
Father's education					
Grade 1-6	13(4.6)		8(2.8)		0.47
Grade 7-9	53(20.0)		44(16.3)		
Grade 10-12	162(61.4)		170(64.0)		
Grade > 12	37(14.0)		46(16.9)		
Father's occupation					
Government workers	16(6.0)		13(4.9)		0.38
Agricultural/skill labour	40(15.1)		37(13.8)		
Private sector	200(75.5)		204(76.1)		
Others	9(3.4)		14(5.2)		

Table 2. Scores and Height Status of Preschoolers, by Location of Study

Score and Height Status	Location of study				TOTAL N=533	
	Deli Serdang, n= 265		Aceh Besar, n=268			
	n	%	n	%	n	%
5 = Severely stunting	10	3.8	18	6.7	28	5.2
6 = Stunting	33	12.4	59	22.0	92	17.3
7= Tend to be stunting	77	**29.0**	90	**33.6**	167	**31.3**
8 = Normal	119	45.0	83	31.0	202	37.8
9 = Tall	20	7.5	14	5.2	34	6.7
10= Very Tall	6	2.3	4	1.5	10	1.9

Table 1 shows the four characteristic variables of pre-schoolers and six characteristic variables of parents. Sexual types, birth weight, birth length and current age of children in the two locations of the study were comparable (p>0.00). The mean of birth weight and length of children in two locations of the study was normal; 3.2±0.38 vs 3.2±0.45 and 48.2±1.9 vs 48.0±1.6 respectively. None of the characteristics of parents were significantly different (p>0.00), even though mothers age in Deli Serdang was relatively younger than in Aceh (26.8±4.44 vs 28.9±4.59) and more high education parents in Aceh than Deli Serdang (80.9% vs 74.5%).

As presented in Table 2. Of 533 pre-schoolers, 22.5% were stunted. Almost one third (31.3%) of children tended to be stunted. In terms of location, number of stunting children in Aceh Besar was almost double than in Deli Serdang (28.7% vs 16.2%), while the number of tall children were more in Deli Serdang than in Aceh Besar (9.8% vs 6.7%).

Table 3. Level of Mother's Knowledge Before and After Intervention

Level of knowledge	Before					After					
	Intervention group, n=54		Control group, n=53		*p-value*	Intervention group,n=50		Control group, n=50		*p-value*	Relative risk
	n	%	n	%		n	%	n	%		
High knowledge	30	55.5	28	52.8	0.58	42	85.2	30	56.6	0.00	3.5(1.5-6.5)
Low knowledge	24	44.5	25	47.2		8	14.8	20	43.4		

Before intervention, the nutritional knowledge in both groups were comparable. However, after intervention there was significantly changing. Table 3 shows, before intervention the proportion of high knowledge between intervention and control group was comparable (55.5% vs 44.5%; p = 0.58). After intervention, the high knowledge improved by 29.7% in intervention group and 3.8% in control group. Mothers in the intervention group were three and half times more likely to have better knowledge (RR = 3.5 (1.5-6.5) and p = .00)

FINDINGS

The present study proved that using score growth chart detected 22.5% stunted children and predicted 31.3% "tend to be stunted" children with HAZ >-1 to -2SD.

Assuming that half of those "tend to be stunted" children (15.7%) will be really stunted, therefore in the next round survey the prevalence of stunting could be in the range of 22.5% to 38.0%. The underlying reasons were because in most of nutritional surveys, parents were never well-informed on their child's nutritional status. Most parents overestimated to their child nutritional status. [22-24] and restricted to get food make the children to have a risk to be malnutrition.[25]. The consequences the prevalence of stunting to be stagnated. This condition had happened in Indonesia. Since 2010 till 2016 prevalence of stunting stagnated at 35.0-37.0%. [5,6] and the coverage of food supplementary, exclusive breastfeeding and growth chart belonging was very low, 36.8%, 29.5% and 34.0%, respectively.[26]

These findings in line with the situation in other developing countries. de Onis et.al, found than by the year 2005-2010 stunting among pre-school children in Africa regions had stagnated at 38.8-38.2% and slightly decrease from 37.6% to 37.1% .[4] In sub-Saharan and Southeast Asia countries, the prevalence of stunting stagnated at 30%-40%, in Eastern Ethiopia 45.8%. [3,27] Lutter CK., et al (2011) also reported that only 36% of children in developing countries had exclusive breastfeeding and around half (˜50%) poor meal practices.[28]

This study found that wall score growth chart was efficient as nutrition education media. Scoring system made it easier for mothers to interprete child growth. Involving mothers in taking child height measurements and to do plotting in the chart were potential parts in nutrition education session. This results in a line with several studies who used a modified growth chart to improve maternal knowledge.[12,16], and the application of scores in health activites.[17,18] However, the economic and education level of participants might have played important role in these achievements.

The implication of this finding was in the next anthropometry survey, it needs to presents specifically the prevalence of children with HAZ >-1 to-2SD status and targeting them into nutritional intervention.

The primary strength of this study was the ability to prove the causes of stagnated stunting prevalence. The main limitation of the study was the sample. This study focused only the pre-schooler age and low number of mothers. Further study needs to cover the under-five year children and to include fathers in nutrition education session.

Figure 1. Taking height measurement individually

Figure 2. Taking height measurement collectively

CONCLUSION

The tracking of an individual child height-for-age z-scores on growth curve is an important indicator for

assessing stunting. This study found that the HAZ-1 to -2SD status is a useful indicator for predicting stunting children. Application of the score system in growth chart was effectively detecting and predicting stunting and improving mothers' knowledge of child growth.

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Conflicts of Interest: We declare that there are no conflicts of interest in this study

Ethical Clearance: The ethical clearance was taken from the Ethics Board, Polytechnic of Health Medan

REFERENCES

1. Zhang Y, Zhou J, Niu F, et al. Characterizing early of height-for-age child growth pattern in an urban slum cohort of Bangladesh with functional principal component analysis. BMC Pediatrics. 2017. 17:84.
2. de Onis Mercedes, Branca Franco. Childhood stunting : Global Perspective. Maternal and Child Nutrition. 2016, May. Suppl 1 :. 12-26
3. Bloem MW,de Pe Saskia, Hop LT, Khan NC, Laillou A, Minarto, *et al*. Key strategies to further reduce stunting in Southest Asia: Lesson from the ASEAN countries workshop. Food and Nutrition Bulletin. 2013. Vol. 34, no. 2 (supplement)
4. de Onis M, Blössner M, Bhorgi E.Prevalence and Trends of stunting among pre-school children, 1990-2020. Public Health Nutrition: 15(1), 142-148
5. Kementerian Kesehatan RI. Pusat Data dan Informasi. Situasi Balita Pendek di Indonesia.
6. Badan Penelitian dan Pengembangan Kesehatan Kemenkes RI (2013). Hasil Riset Kesehatan Dasar (RISKESDAS 2013). Badan Penelitian dan Pengembangan Kesehatan, Jakarta.
7. Gorstein J, Sullivan K et al. Issues in the assessment of nutritional status using anthropometry. Bulletin of WHO, 1994, 72(2) : 273-283.
8. Roberfroid D., Pelto GH., Kolsteren, P. Plot and See!. Maternal Comprehension of Growth Charts Worldwide. Tropical Medicine Int. Health, *2007*.10(11):1121-1133
9. Badan Penelitian dan Pengembangan Kesehatan Kemenkes RI (2007). Hasil Riset Kesehatan Dasar (RISKESDAS 2013). Badan Penelitian dan Pengembangan Kesehatan, Jakarta.
10. Ben-Joseph EP, Downshen SA, Izenberg N. Do Parents Understand Growth Charts ? A National, Internet-Based Survey. PEDIATRICS. *Official Journal of The American Academy of Pediatrics.2009*
11. Sinaga HT, Mahdiah, Manalu M. Using modified growth chart in Posyandu effectively improve child weight gain in Deli Serdang Distric. Pakistan Journal of Nutrition, 2015 14(9) : 447-552
12. Brownlee A. Growth Monitoring And Promotion: The Behavioural Issues in Child Survival Programs. The Office of Health US. Agency For International Development. Monograph Number Six. 1990
13. Abuya BA, Ciera J, Murage EK. Effects of mothers education on child's nutritional status in the slums of Nairobi. BMC Pediatric Journal. 2012;12;80,
14. Handa S. Maternal education and child height. Economic Delv.Culture Change. 1999. 47(2):421-439
15. Sinaga HT, Alfridsyah, Sitanggang B, Hadi A. A simple nutrition screening tool for detecting stunting of Pre-Schoolers : Development and Validity Assessment. Pakistan Journal of Nutrition, Volume 17, Number 5, 2018)
16. Ruel, M. T., Habict., Jean-Pierre (1992). Growth charts only marginally improved maternal learning from nutrition education and growth monitoring in Lesotho. Community and International Nutrition.
17. Schapira MM, Fletcher KE, Ganschow PS, Walker CM, Tyler B, Del Pozo S, *et al*. The Meaning of Numbers in Health: Exploring Health Numeracy in a Mexican-American Population. *Journal Gen Intern Med*. 2011. 26(7):705-11.
18. Spagnuolo MI, Ligioro I, Chiatto F, Mambretti D, Guarino A. Application of score system to evaluate the risk of malnutrition in a multiple hospital setting. Italian Journal of Paediatrics, 2013, 39:81.

19. Dinas Kesehatan Propinsi Sumatera Utara. Hasil Pemantaua Status Gizi Provinsi Sumatera Utara Tahun 2016

20. Dinas Kesehatan Propinsi Aceh. Hasil Pemantaua Status Gizi Provinsi Aceh Tahun 2016

21. Lemeshow S, Hosmer DW, Klar J, Lwanga SK. Besar Sampel Dalam Penelitian Kesehatan (Terjemahan Dibyo Pramono).FKG-UGM, Yogyakarta-Indonesia.1997

22. Warkentin S, Mais LA, do Rosário, et al. Factors associated with parental under-estimiation of child weight status. J Pediatria (Rio J). 2018 ; 94(2): 162-169;

23. Lundahl A, Kidwell KM, Nelson TD. Parental underestimate of child weight. A meta-analysis. Pediatrics 2014; 133:e689-703;

24. Sorte NB, Neri LA, Leite MEQ, et al. 2007. Maternal Perceptions and self perception of the nutritional status of children and adolescent from private school. J Pediatria. 2007; 83: 349-356.)

25. Davison KK, Birch LL. Weight status, parent reaction and self-concept of five year old girl. Pediatrics 2001 January; 107 (1); 46-53.

26. Kementerian Kesehatan RI. Laporan Hasil Pemantauan Status Gizi 2016

27. Yisak, H. Et l. Prevalence and risk factors for under nutrition among children under five at Haramaya District, Eastern Ehiopia. BMC Pediatrics, 2015).

28. Lutter CK., et al (2011) Undernutrition, Poor Feeding Practices and Low Coverage of Key Nutrition Intevention. Pediatrics)

The relationship between Hypermobility Syndrome and Systemic Lupus Erythematosus

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ABSTRACT

Objectives: investigate joint laxity in patients with systemic lupus erythematosus (SLE).

Patients and Method: case-control study involved 53 patients with SLE; disease activity for SLE assessed with the SLE Disease Activity Index (SLEDAI). Case histories and personal information assessed: age, SLE disease duration, body mass index (BMI), all subjects screened for hypermobility syndrome according to criteria of Beighton for joint hypermobility (total score 4 or more).

Results: Twenty-eight (52.8%) of the patients SLE had hypermobility compared to 31 (47.7%) of the control group. There is a slight increase in the risk of hypermobility in SLE patients compared to control the OR (95%CI): 1.229 (0.594-2.540). Considering joints complain Elbow pain was significantly higher in SLE patients compared to control. However, the rest (back, knee, and shoulder) showed no statistical difference between SLE and control. In SLE patients lower BMI associated significantly with hypermobility. There was a weak inverse relationship between hypermobility and age. There was no significant association in systemic lupus erythematosus patients between hypermobility with Anti- dsDNA, ANA, C_3 and C_4, but longer duration of disease and higher disease activity (SLEDI) associated weakly with hypermobility.

Conclusion: SLE patients had a similar probability of having hypermobility compared to control, hypermobility increase with increasing immunological markers and with lower age and BMI, disease activity and ESR weakly increase the risk of hypermobility in SLE patients. Elbow joint pain associated with hypermobility in SLE compared to control while no such relationship found with back, knee and shoulder pain.

***Keywords**: SLE, Hypermobility, disease activity index, joint pain, disease activity*

INTRODUCTION

SLE is a prototypic autoimmune disease characterised by multisystem involvement and the production of an array of autoantibodies. Clinical features in individual patients are highly variable, ranging from skin and joint involvement to organ- and life-threatening disease. SLE is typically associated with a waxing and waning clinical course, but some patients have continuous disease activity [(1)]. Systemic lupus erythematosus primarily is a disease of young women, with a peak incidence between the ages of 15 and 40 and a female: male ratio of 6 – 10: 1. The age at onset, however, can range from infancy to advanced age; in both pediatric- and older-onset patients, the female: male ratio is approximately 2:1 [(2)]. The reported prevalence of SLE in the general population is approximately 20 to 150 cases per 100,000 persons [(3)]. In Iraq, the prevalence of SLE was estimated to be one case per 1867 of the population, one per 1127 of the total female population and for women aged between 10 and

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49 years it was one per 616 [4].

Benign joint hypermobility syndrome (BJHS) is a heritable disorder associated with laxity and pain in multiple joints [5]. It found in chromosomal and genetic disorders such as Down syndrome and metabolic disorders such as homocystinuria and hyperlysinemia [6]. Benign hypermobility syndrome may present with joint dislocation and subluxation, arthralgia, arthritis, tendonitis, tenosynovitis, damaged ligaments and ligamentous attachments and fractures. BJHS can also involve other organ systems resulting in other collagen-related disorders [7]. Benign Joint hypermobility syndrome (BJHS) is very common in musculoskeletal disease clinics, but the diagnosis often missed, and the actual prevalence of JHS is not known [8]. In general, women have greater joint laxity than men [9]. In Iraq, the prevalence of joint hypermobility among university students determined from a survey made in 1981 in 25.4% of males and 38.5% of females [10].

METHOD

Study design: a case-control study conducted at the Rheumatology Unit Department of Medicine in Baghdad Teaching Hospital from September 2016 to May 2017.

Sample selection: a total of 106 subjects enrolled in the study, 53 of them diagnosed as SLE, met the revised American College of Rheumatology (ACR) classification criteria [11], and 53 were controls age between (18-50). The degrees of joint hypermobility in both groups recorded according to Beighton method for all participants in the two groups. Participants who recorded 4 or more scores were considered hypermobile [12]. Hypermobility measured without blinding; patients excluded if they suspected of having Marfan or Ehler-Danlos syndromes—namely, the presence of a marfanoid habitus, dermal extensibility, and cutaneous scarring. Patients with renal failure and on haemodialysis excluded.

Data collection: All patients reviewed for age, gender, occupation, educational status, body mass index (BMI), SLE disease duration, data related to main disease manifestations and other related features to BJHS. Disease activity for SLE assessed with the SLE Disease Activity Index (SLEDAI) [13]. Sociodemographic data and medications recorded.

Laboratory measurement: 1) Blood investigations measured in the form of haemoglobin, white blood cells (total and differential count), platelets, blood urea, serum creatinine, serum GPT, serum GOT, antinuclear antibodies, anti-double stranded-DNA (anti-ds-DNA) antibodies, and complements components. 2) Urine examination is done for the measurement of protein, white blood cells, red blood cells and cellular casts.

Ethical approval and signed consent: Ethical approval was taken from the medical department in Baghdad teaching hospital and college of medicine. Informed written consent was taken from the individuals for admission in the study.

Statistical analysis: chi-square test or Fisher exact test (used instead of chi-square for a 2x2 table, if total sample <20 and if 2 or more with an expected frequency is less than 5) used to analyse the discrete variable between 2 groups. Two samples t-test used to analyse the differences in means between two groups (if both follow a normal distribution with no significant outlier). Binary logistic regression analysis used to calculate the odds ratio (OR) and their 95% confidence intervals, when the outcome can categorise into two binary levels. SPSS 20.0.0 software package used to make the statistical analysis, p-value considered when appropriate to be significant if less than 0.05

RESULTS

All the patients and control in this study were females with mean age of SLE patients 33.0 ± 10.1 years and 31.0 ± 9.9 years for control, 26.6 ± 5.3 kg/m^2 was the BMI for control and 26.7 ± 6.2 kg/m^2 for SLE patients, the rest of the data explained in table 1. There was no significant difference between a patient with SLE and control in age, sex (all patients and control were female), weight, height and BMI, as illustrated in table 1.

Table 1: Demographic and clinical characteristics of patients and controls

Variables	Controls	SLE	P value
Number	65	53	-
Age (years), mean ± SD	33.0 ± 10.1	31.0 ± 9.9	0.277
Sex			-
Female	65 (100%)	53 (100%)	
Weight, mean ± SD	67.9 ± 14.9	67.4 ± 15.7	0.862
Height, mean ± SD	159.6 ± 6.4	157.2 ± 15.3	0.249
BMI, mean ± SD	26.6 ± 5.3	26.7 ± 6.2	0.972
Disease duration (years), median (IQR)	-	4 (1 – 7)	-
SELENA-SLEDI score	-	8 (2 – 12)	-
Inactive disease	-	20 (37.7%)	-
Active disease	-	33 (62.3%)	-
Hemoglobin, mean ± SD	-	12.0 ± 2.0	-
WBC, mean ± SD	-	8.1 ± 3.4	-
Platelet, mean ± SD	-	264.6 ± 87.7	-
ESR, median (IQR)	-	35 (24 – 53)	-
Positive Anti-Ds DNA	-	24 (45.3%)	-
Positive ANA	-	49 (92.5%)	
Decreased C_3	-	7 (13.2%)	-
Decreased C_4	-	17 (32.1%)	-
SLE: systemic lupus erythematosus, ANA: Anti-nuclear antibody, Anti –dsDNA: Anti-double-stranded deoxyribonucleic acid, cm: Centimetre, kg: kilogram, WBC: white blood cell, ESR: Erythrocyte sedimentation rate			

The percentage of DM and hypertension in both SLE and control was not statistically significant (despite that their percentages were higher in SLE patients), considering joints complain only Elbow was significantly higher in SLE patients compared to control (18.9% vs 1.5%), however the rest (back, knee, and shoulder) was not statistically different between SLE and control, as illustrated in table 2

Table 2: Co-morbid disease and joint complain for patients and controls

Variables		Controls	SLE	P value
Number		65	53	-
Co-morbid diseases				
DM	Not	65 (100.0%)	50 (94.3%)	0.088
	DM	0 (0.0%)	3 (5.7%)	
Hypertension	Not	61 (93.8%)	44 (83.0%)	0.062
	HTN	4 (6.2%)	9 (17.0%)	
Joint complain				
Back	Negative	52 (80.0%)	43 (81.1%)	0.877
	Positive	13 (20.0%)	10 (18.9%)	
Elbow	Negative	64 (98.5%)	43 (81.1%)	0.001 [Sig.]
	Positive	1 (1.5%)	10 (18.9%)	
Knee	Negative	53 (81.5%)	42 (79.2%)	0.754
	Positive	12 (18.5%)	11 (20.8%)	
Shoulder	Negative	65 (100.0%)	51 (96.2%)	0.200
	Positive	0 (0.0%)	2 (3.8%)	
DM: Diabetes mellitus, HTN: hypertension, SLE: Systemic lupus erythematosus				

Despite there was no statistically significant difference between patients and control median Beighton score was higher in patients than control four versus 3, and 52.8% of the SLE had hypermobility compared to 47.7 in control (there is 22.9% probability that patients with hypermobility have SLE compared to control), as illustrated in table 3.

Table 3: hypermobility and Beighton score for patients and controls

Variables	Controls	Patients	P value	OR (95%CI)
Number	65	53	-	-
Beighton score for joint hypermobility	3 (2 – 6.5)	4 (2 – 6)	0.825	1.229 (0.594-2.540)
No hypermobility	34 (52.3%)	25 (47.2%)	-	
Hypermobility	31 (47.7%)	28 (52.8%)	-	
OR: odds ratio, (95%CI): Confidence interval,				

Younger age (≤30 years), low haemoglobin, low WBC, low platelet-associated weakly with hypermobility, however only lower BMI associated significantly with hypermobility. Positive DNA, and positive C_4 associated weakly with hypermobility (2 folds associated with hypermobility), positive C_3, positive ANA, longer duration of disease and higher disease activity (SLEDI) also associated weakly with hypermobility as illustrated in table 4

Table 4: Hypermobility in SLE patients

Variables	No hypermobility	Hypermobility	P value	OR (95%CI)
Number	25	28	-	-
Age (years)	33.4 ± 10.5	28.8 ± 9.0	0.062	0.952 (0.890-1.003)
≤30 years	13 (52.0%)	15 (53.6%)	0.909	0.939 (0.319-2.766)
>30 years	12 (48.0%)	13 (46.4%)	-	1.0
BMI	28.4 ± 7.2	25.2 ± 4.8	0.037	0.914 (0.818-0.997)
<25	11 (44.0%)	15 (53.6%)	0.507	1.0
25 – 29.9	5 (20.0%)	7 (25.0%)	0.278	0.489 (0.134-1.782)
≥30	9 (36.0%)	6 (21.4%)	0.970	1.027 (0.257-4.108)
Hemoglobin	12.2 ± 1.7	11.9 ± 2.2	0.577	0.922 (0.698-1.220)
WBC	8.6 ± 4.0	7.7 ± 2.8	0.372	0.370 (0.787-1.093)
Platelet	287.0 ± 80.1	244.6 ± 90.6	0.079	0.994 (0.987-1.001)
ESR	33 (23 – 44.5)	42 (25.3 – 57)	0.373	1.014 (0.986-1.043)
Disease duration	4 (1.5 – 6.5)	4 (1 – 7)	0.886	0.990 (0.918-1.068)
SLENA-SLEDI	8 (3 – 10)	8 (2 – 12)	0.719	1.016 (0.934-1.105)
Inactive	9 (36.0%)	11 (39.3%)	-	-
Active	16 (64.0%)	17 (60.7%)	-	-
DsDNA (positive)	9 (36.0%)	15 (53.6%)	0.202	2.051 (0.680-6.186)
ANA (positive)	23 (92.0%)	26 (92.9%)	0.906	1.130 (0.147-8.682)
C_3	3 (12.0%)	4 (14.3%)	0.806	1.222 (0.246-6.083)
C_4	6 (24.0%)	11 (39.3%)	0.238	2.049 (0.623-6.740)

DISCUSSION

In the current study, 52.8% of the systemic lupus erythematosus patients had Beighton score ≥four while 47.7% of the matched control had Beighton score ≥4, and those joints classified as hypermobile. The current study aimed to the possible correlation between systemic lupus erythematosus and hypermobility joint in a case-control study. The results of the current study was in agreement with previous studies in which there was no significant difference in the rate of hypermobility between systemic lupus erythematosus patients compared to matched control, initial study by Klemp et al. [1] reported 7% vs 6% hypermobility between

systemic lupus erythematosus and control respectively; and in their study [1] the frequency of hypermobility in both systemic lupus erythematosus and control was lower than our, also in another study [2] the frequency of hypermobility 23% vs 27% in SLE vs control which also was similar to our finding of no association between systemic lupus erythematosus and hypermobility. These difference in the rate of hypermobility among studies and compare to the current study caused by the different methodology in each study.

In systemic lupus erythematosus patients, there was no significant difference between patients with Beighton score ≥4 with those <4 in age, and disease duration which is similar to the findings of Klemp et al. [14], indicating both these variables did not affect increasing or decreasing the frequency of hypermobility in SLE patients.

Back, knee and shoulder joint complain statistically not significant between systemic lupus erythematosus and control, while in Gumà et al. [15] more than 80% of systemic lupus erythematosus patients had musculoskeletal symptoms which they attributed this high rate of symptom to SLE disease activity and less came from hypermobility; while in the current study both groups had a low rate of such joint involvement in both control and SLE and more large sample size are needed, or our patients had low disease activity or in remission [15].

Systemic lupus erythematosus patients presented with the generalised tendinous condition, especially those present with atlantoaxial subluxation, Jaccoud's arthropathy, and tendinitis. In a study [15] the authors reported that half of their SLE patients had localised hand hypermobility, and they also reported the most frequent manifestations were distal interphalangeal joint laxity and wrist instability [15].

In the current study no significant association in systemic lupus erythematosus patients between hypermobility with dsDNA, ANA, C_3 and C_4 (using univariate binary logistic regression analysis to predict the association) which in agreement with Gumà et al. [15] of no association between hypermobility with immunological, clinical and analytical features of SLE.

In the current, there was a weak inverse relationship between hypermobility and age (odds ratio = 0.952, i.e. for each year the patient younger there is 4.8% increased probability of having hypermobility) which is similar to the previous study of increased hypermobility in younger age [16] and decreased slowly with ageing. In the current study we could not assess the relationship between gender and hypermobility since all our patients are females which is a possible bias of neglecting males, however, the rationale for this that female had a higher prevalence in SLE patients and also female had a higher rate of hypermobility; so we exclude male from seeing the effect of hypermobility of female SLE patients they are born to higher possible risk for both conditions [16].

In the current study the effect of BMI was similar between SLE and control (p = 0.972), however within the SLE patients there was inverse correlation between BMI and hypermobility (OR=0.914, p =0.037) indicating the lower the BMI the higher probability of having hypermobility (1 unite increase in BMI there is 8.6% increased probability of having hypermobility), no study in the literature study the effect of BMI on hypermobility in SLE patient founded, and this the first reported observation about this correlation.

There is a slight increase (i.e. non-significant) in the association between disease activity of SLE and hypermobility (odds ratio = 1.016) indicating the higher the disease activity, the higher the probability (by 1.6% for each unit increase in disease activity) of having hypermobility. In the current study only elbow joint was significantly higher in SLE patients compared to control, no current explanation why the only elbow was significantly higher in SLE compared to control while other joint did not, which could be caused by low sample size that affects the power of detection of this, further studies are required to elucidate this relationship.

CONCLUSION

Systemic lupus erythematosus patients had similar probability of having hypermobility compare to control, hypermobility increase with increasing immunological markers, hypermobility increase with decreasing age and BMI, disease activity and ESR weakly increase the risk of hypermobility in SLE patients, and Elbow joint complains associated with hypermobility in SLE compared to control while no such relationship found with back, knee and shoulder pain.

Conflict of Interest : None

Ethical Clearance: Informed written consent obtained from all the participants in the study, and the

study and all its procedure were done by the Helsinki Declaration of 1975, as revised in 2000. The study approved from the medical department in Baghdad teaching hospital and college of medicine

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REFERENCES

1. Marina DE. Systemic lupus erythematosus. In: Imboden JB, Hellmann DB, Stone JH, editors. Current diagnosis and treatment rheumatology. 3rd ed2013. p. 187.
2. David SP. Systemic lupus erythematosus: epidemiology pathology and pathogenesis. In: Klippel JH, Stone JH, Crofford LJ, White PH, editors. Primer on the rheumatic diseases. 13th ed. New York, USA: Springer; 2008. p. 319-26.
3. Maidhof W, Hilas O. Lupus: an overview of the disease and management options. P & T : a peer-reviewed journal for formulary management. 2012;37(4):240-9.
4. Al-Rawi Z, Al-Shaarbaf H, Al-Raheem E, Khalifa SJ. Clinical features of early cases of systemic lupus erythematosus in Iraqui patients. British journal of rheumatology. 1983;22(3):165-71.
5. Palmer S, Cramp F, Clark E, Lewis R, Brookes S, Hollingworth W, et al. The feasibility of a randomised controlled trial of physiotherapy for adults with joint hypermobility syndrome. Health technology assessment (Winchester, England). 2016;20(47):1-264.
6. Simpson MR. Benign joint hypermobility syndrome: evaluation, diagnosis, and management. The Journal of the American Osteopathic Association. 2006;106(9):531-6.
7. Lammers K, Lince SL, Spath MA, van Kempen LC, Hendriks JC, Vierhout ME, et al. Pelvic organ prolapse and collagen-associated disorders. International urogynecology journal. 2012;23(3):313-9.
8. Grahame R. Hypermobility: an important but often neglected area within rheumatology. Nature clinical practice Rheumatology. 2008;4(10):522-4.
9. Engelbert RH, Uiterwaal CS, van de Putte E, Helders PJ, Sakkers RJ, van Tintelen P, et al. Pediatric generalized joint hypomobility and musculoskeletal complaints: a new entity? Clinical, biochemical, and osseal characteristics. Pediatrics. 2004;113(4):714-9.
10. Al-Rawi ZS, Al-Aszawi AJ, Al-Chalabi T. Joint mobility among university students in Iraq. British journal of rheumatology. 1985;24(4):326-31.
11. Tan EM, Cohen AS, Fries JF, Masi AT, McShane DJ, Rothfield NF, et al. The 1982 revised criteria for the classification of systemic lupus erythematosus. Arthritis and rheumatism. 1982;25(11):1271-7.
12. Beighton P. Hypermobility scoring. British journal of rheumatology. 1988;27(2):163.
13. Gladman DD, Ibanez D, Urowitz MB. Systemic lupus erythematosus disease activity index 2000. The Journal of rheumatology. 2002;29(2):288-91.
14. Klemp P, Majoos FL, Chalton D. Articular mobility in systemic lupus erythematosus (SLE). Clinical rheumatology. 1987;6(2):202-7.
15. Guma M, Olive A, Roca J, Forcada J, Duro JC, Holgado S, et al. Association of systemic lupus erythematosus and hypermobility. Ann Rheum Dis. 2002;61(11):1024-6.
16. Hakim A, Grahame R. Joint hypermobility. Best practice & research Clinical rheumatology. 2003;17(6):989-1004.

Mapping the Model of Ecological Vegetation as Potential Malaria Habitats in a Malaria-Endemic Region in Oesao Village, Kupang Regency, Indonesia

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ABSTRACT

Environmental risk factors, both physical and biological (e.g. ecology of vegetation/plants, forest), equally serve as the risk factors for *Anopheles* mosquitos breeding. This study was designed to determine a model of spatial mapping for the ecology of vegetation and the potential habitats for the *Anopheles* mosquitos. Descriptive epidemiological research was implemented to carry out the project, supported with a cross-sectional design. The research took place in Kupang regency, Oesao village, lasting for 2 months from October to November 2014. The ecology of the vegetation and all habitats of the mosquitos in Oesao village were regarded as the population of the research. They were purposively sampled. The vegetation mapping revealed that the land area for rice fields is 169 ha, coconut and banana tress 56.68 ha, maize 67.03 ha, vegetable plants 59.53 ha, forages 21.52 ha, and forests 16.24 ha. The results of the mapping also revealed that the mosquitos breeding sites entail paddy fields, swamps, irrigation channels, and damps. The ecology of all types of plants mapped serves as potential habitats for the *Anopheles* mosquitos breeding sites. Plant ecology is quite varied in the Oesao Village, as well as extensive areas of the plant that are closely linked to inadequate growth and development of mosquitoes and specific species of *Anopheles*, *An. vagus* and *An. annularis*.

***Keywords**: Ecological vegetation mapping; Breeding sites; Malaria mosquitos*

INTRODUCTION

Malaria, a mosquito-borne disease, has caused an enormous number of deaths worldwide, particularly in the developing countries[(1)]. Children and pregnant women are the most vulnerable groups to malaria deaths. The eastern Indonesia province of Nusa Tenggara Timur (NTT) is one of the provinces with the third highest malaria case in Indonesia; there was an estimated of 16.37% of malaria cases confirmed with blood test[(2)]. Based on the Annual Report of the Provincial Health Office of NTT, the annual parasite incidence (API) for Kupang regency has been high for the last three years, with API of 3.55 ‰ in 2009, 6.48 ‰ in 2010, and 6.72 ‰ in 2011[(3)].

There are community health centers (*puskesmas*) in Kupang regency showing an increase of malaria cases, included as health centers with high case incidence (HCI), i.e. Oesao, Naikliu and Oekabiti. The health center in Oesao district is the one with the highest number of increasing malaria cases. Concerning the Annual Parasite Incidence (API) in Oesao, it reached 4.04 ‰ in 2009, and continuously increased to 7.67 ‰ in 2010 and 10.17 ‰ in 2011[(4)].

In NTT province the physical and biological environment (plant/plant ecology, forest) serves as environmental risk factors for *Anopheles* mosquitos

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breeding. This is so, for the spread, cluster and varieties of plants greatly vary; it is further supported by temperature, light intensity, air temperature, humidity, wind speed and precipitation, all of which provide suitable breeding environments for *Anopheles* population. The bionomic life of mosquitos that suits both the environment and cultural factors present in the society and the community behaviors becomes reinforcing and enabling factors, supporting the *Anopheles* mosquitos breeding in NTT province. As a result, it still places the province at a high risk of malaria cases and this becomes the major problem in the pursuit of malaria eradication.

There has not been an effort made to carry out spatial mapping (geographically) to map the physical and ecological factors of plants and mosquito breeding sites; the employment of advanced technology for mapping local specific areas with appropriate and accurate equipments is still rare as well. Such technology is pivotal to obtain a description of the physical environment conditions, the ecological patterns (species and area of forests/plants), and the geographical locations of the mosquito breeding sites (river, lake, standing water, ditch).

This study aims to map the risk factors for malaria: mapping of plant ecology and potential breeding habitats of *Anopheles* mosquitos. Furthermore, images of the mapping are used as the basis in establishing malaria intervention and eradication model in malaria endemic areas in Kupang regency.

MATERIALS & METHOD

Research Design

Descriptive epidemiological research was implemented to carry out the project, administering surveys to obtain ecological and geographical information. Furthermore, a cross-sectional study was employed. This research was conducted in Kupang regency, Oesao district. The research lasted for 2 months running from October to November 2014. Population in this research is all *Anopheles* sp mosquito habitats and plant ecology in Oesao distric, Kupang regency.

Data Collection

The mapping of plant ecology and malaria breeding sites is done by mapping the distribution and abundance of plants in the *Anopheles* sp mosquito habitats and measuring the mosquito breeding sites in the malaria endemic areas using GIS and GPS equipments.

Research Instruments

GPS (Global positioning system) was operated to take coordinates and track the mosquito habitats in the research site and a software, was respectively employed to process the data.

Data Analysis

The data obtained were presented in the form of spatial map images, which were then spatially and descriptively analyzed. Spatial data analysis program was used to process the spatial data.

FINDINGS

The larval habitat map consists of 4 habitat types: rice fields, swamps, rivers, irrigation channels, and dams. Based on Figure 1, it can be seen that larval habitats for rice fields have larger areas than other larval habitats; the arable area is 169.00 Ha. Other larval habitats found are water dams, swamps, irrigation channels and rivers, all of which become the breeding sites of *Anopheles* mosquito larvae. From the above map, it appears that all potential habitats for the growth and the spreading of *Anopheles* mosquito larvae reside in this region, covering a quite large area.

As presented in Figure 2, the area for coconut and banana trees covers 56.68 hectare. They are kinds of high-tree plants. So far, there has not been any research finding describing the leaves of coconut and banana trees as favorite resting places for *Anopheles* mosquitos.

Based on Figure 3, the map of the distribution of the maize (not kinds of high-tree plant species) spread evenly throughout the village. The area of maize is 67.03 hectare. From all plant species, maize covers the largest area.

Vegetable plants widely found in Oesao village are mustard, water spinach, cabbage, and root tuber. The land area for the vegetable crops is 59.53 hectare. Most people work to grow fast growing or short-term vegetables that can be immediately harvested. The crops are for local consumption, and they are also sold (Figure 4).

Figure 5 shows the forest land area in Oesao village. The forest land area for large plant types is quite small, covering only 16.24 hectare. It is the smallest area

compared to other areas in the village.

Types of plants included in forage plants are red barons, grasses, and shrubs. In Figure 6 above, it is shown that the land area for the forage plants covers approximately 21.52 hectare.

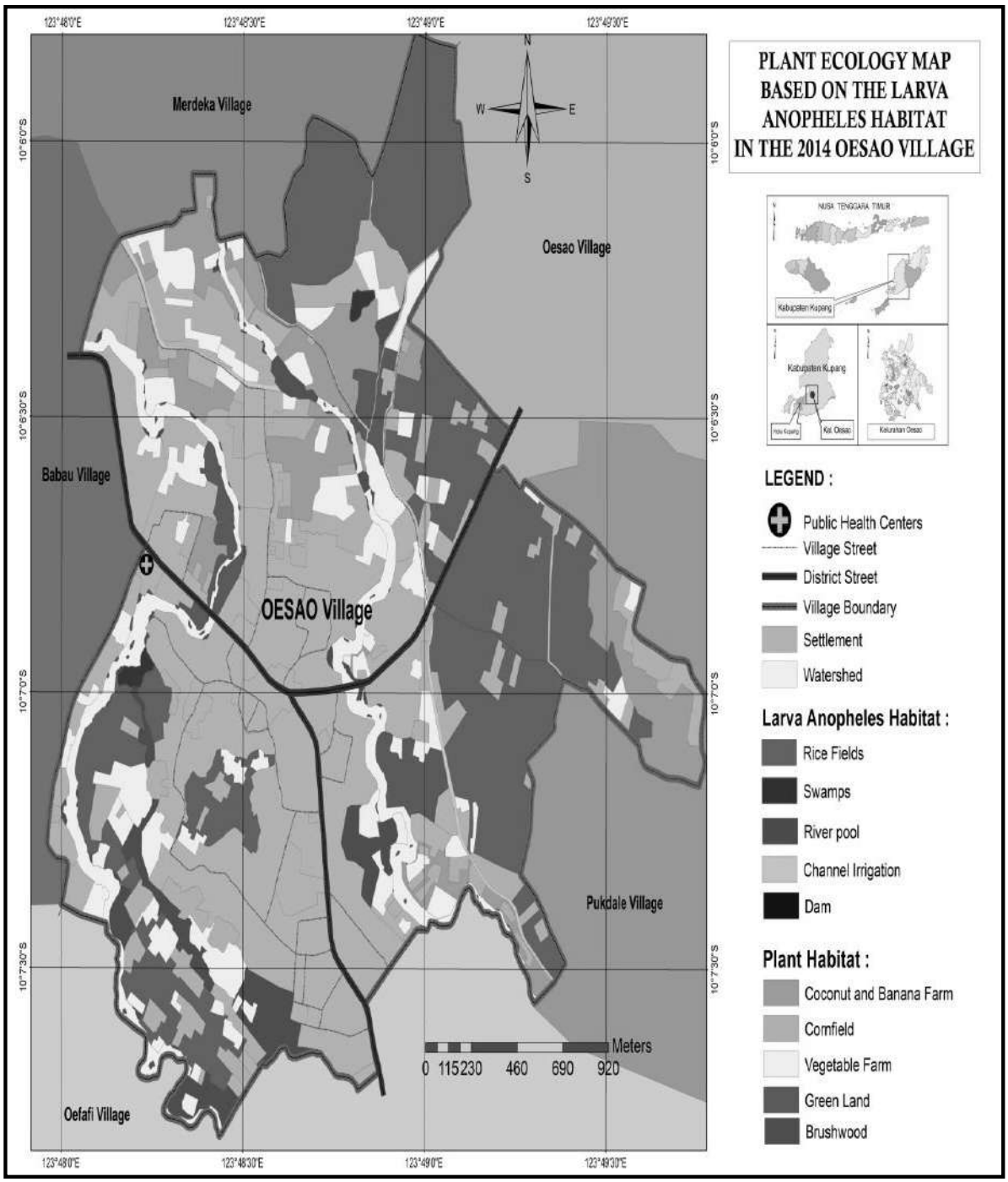

Figure 1. A Map of mosquito breeding sites (*Anopheles Sp* larval habitats) and ecology of vegetation in Oesao Village in 2014

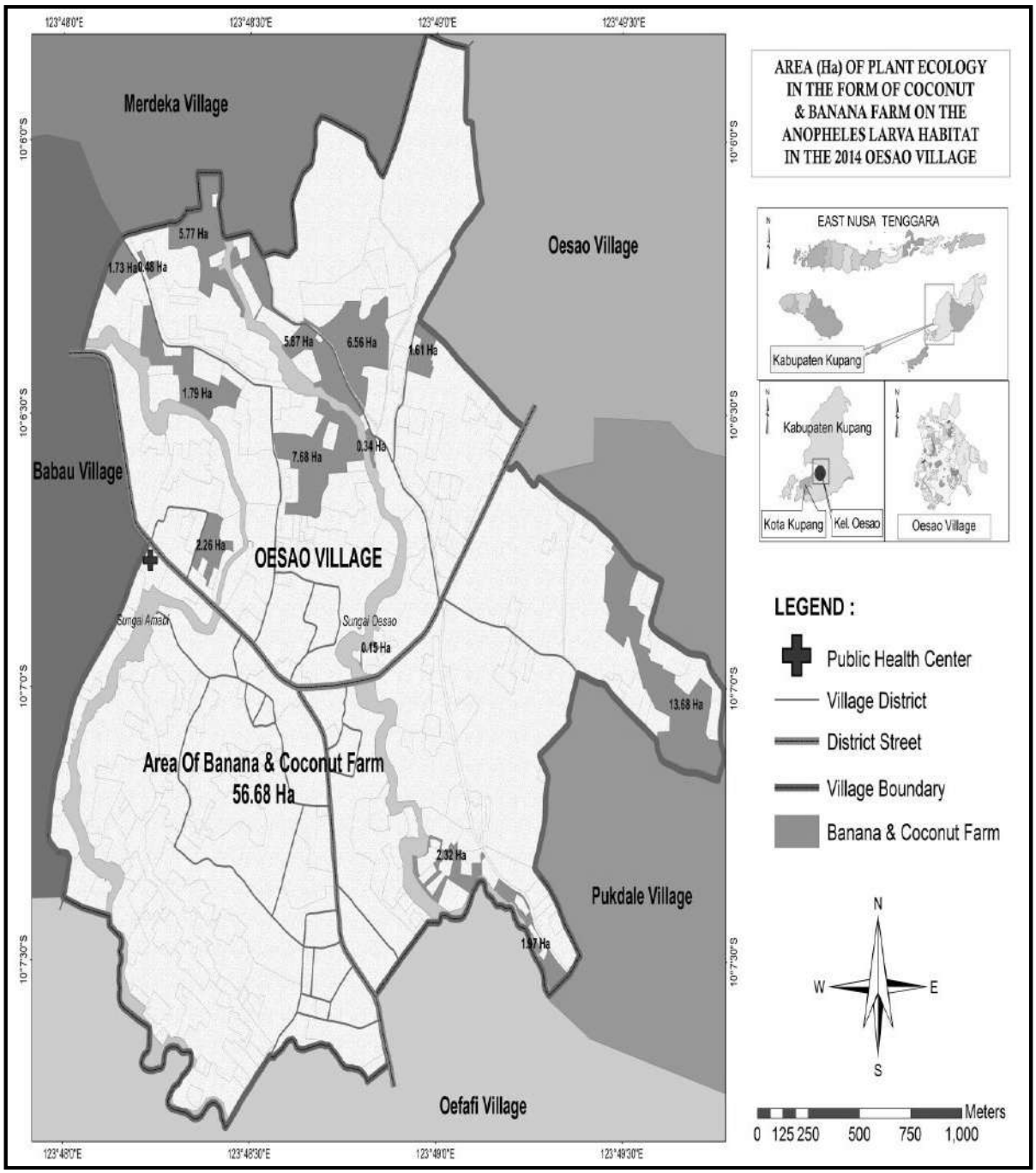

Figure 2. A map of ecology of coconut and banana trees and the land area in Oesao Village in 2014

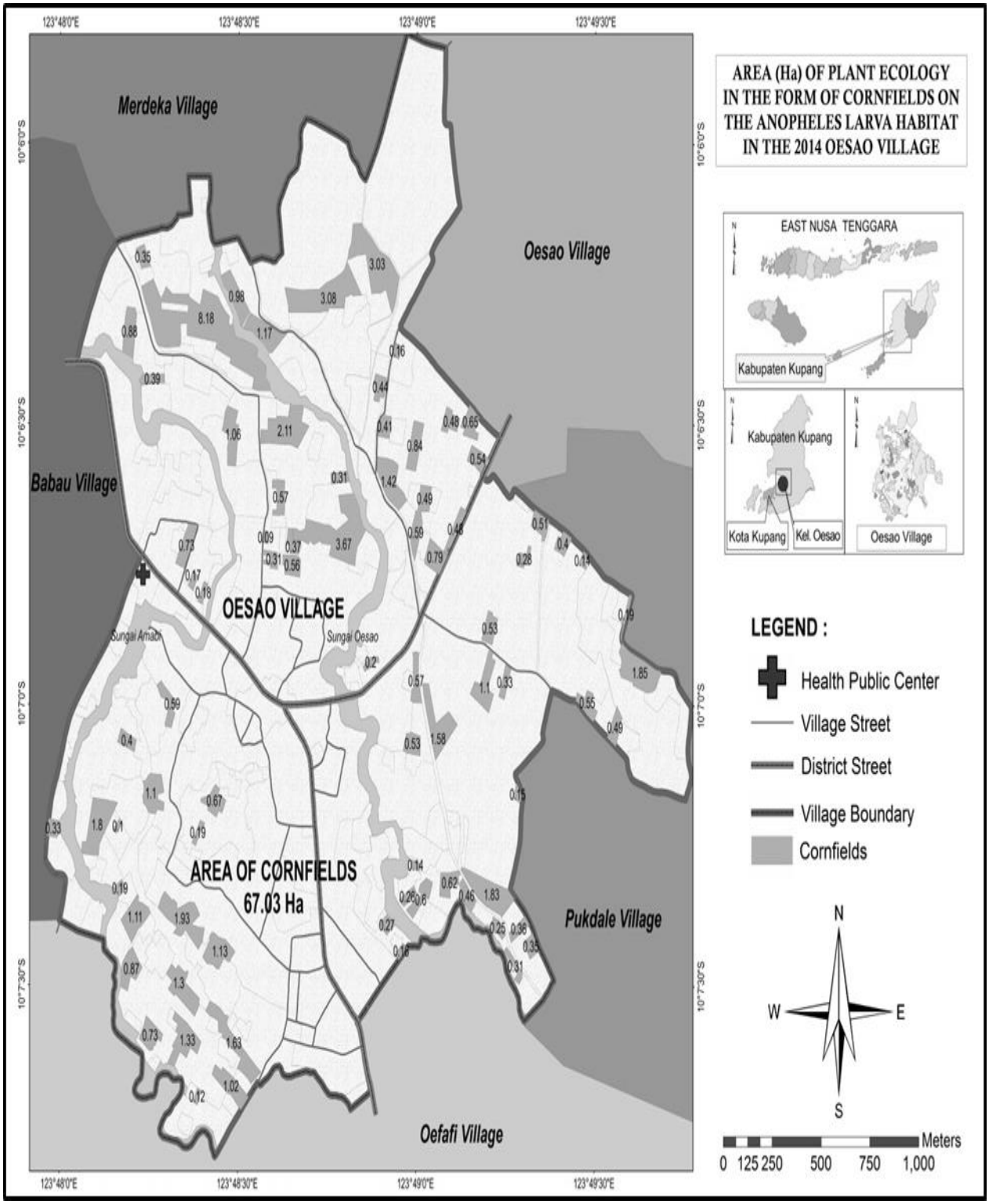

Figure 3. A map of ecology of maize and the land area in Oesao Village in 2014

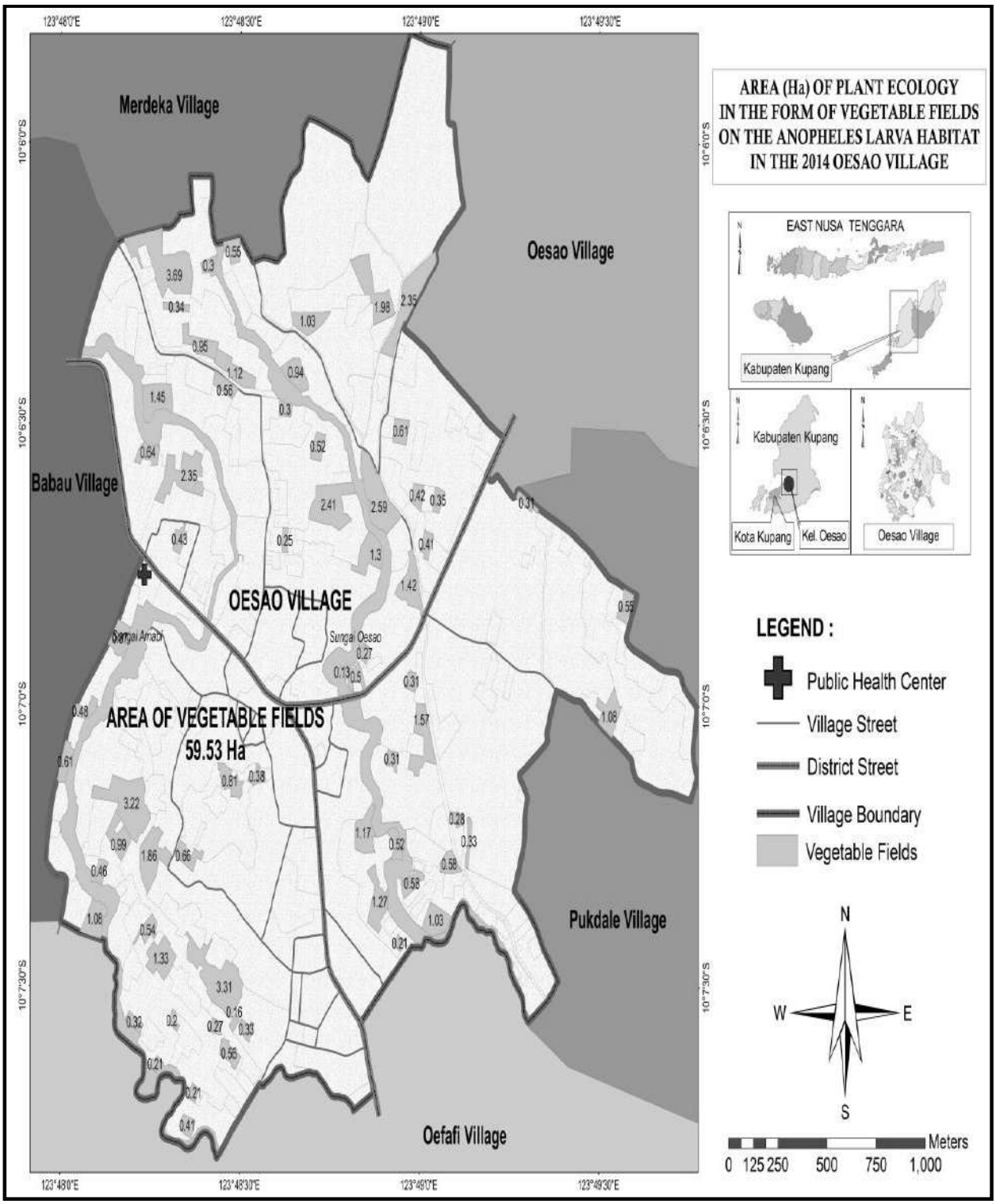

Figure 4. A map of ecology of vegetable plants and the land area in Oesao Village in 2014

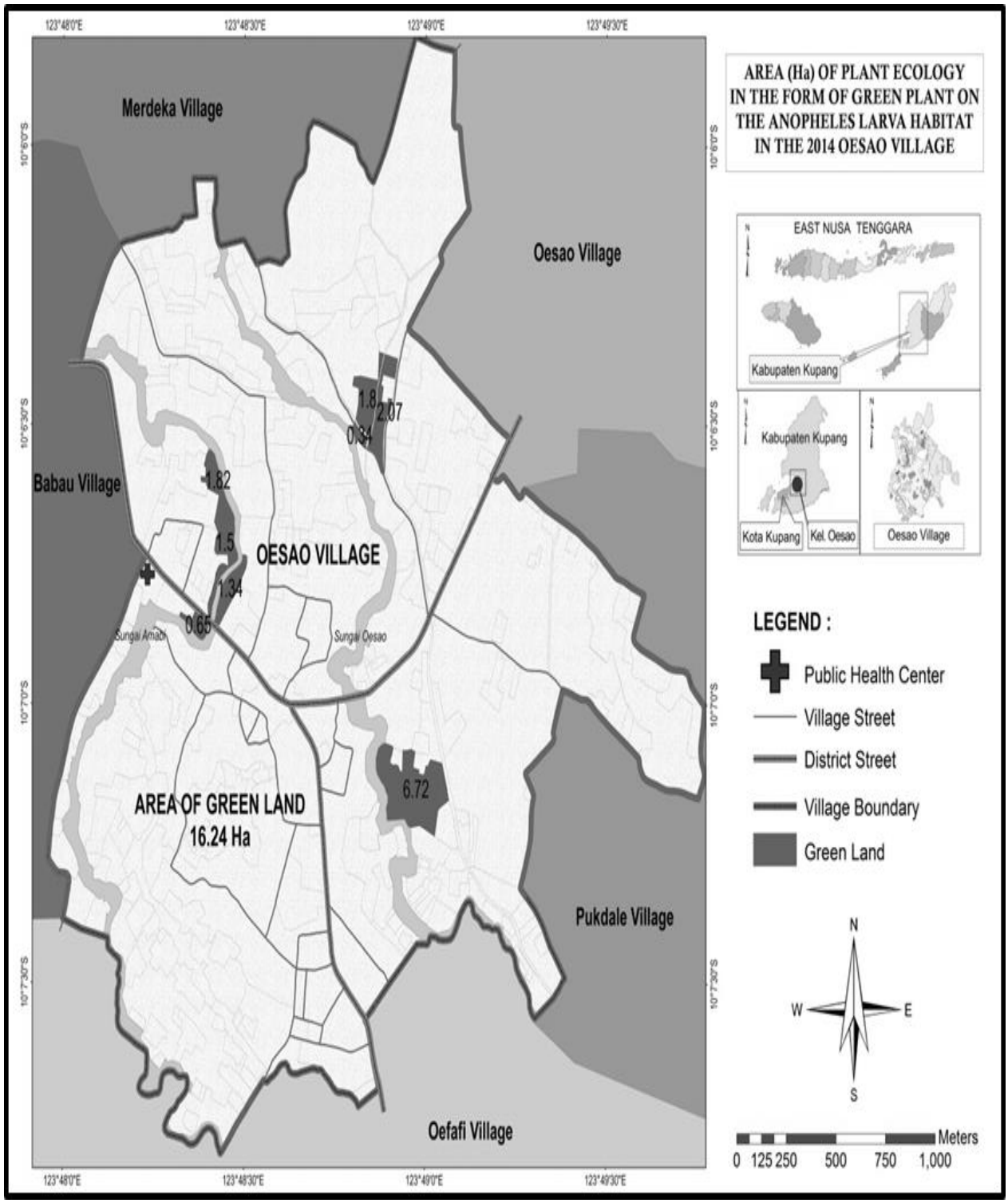

Figure. 5 A map of ecology of forest area/large plants (green area) in Oesao Village in 2014

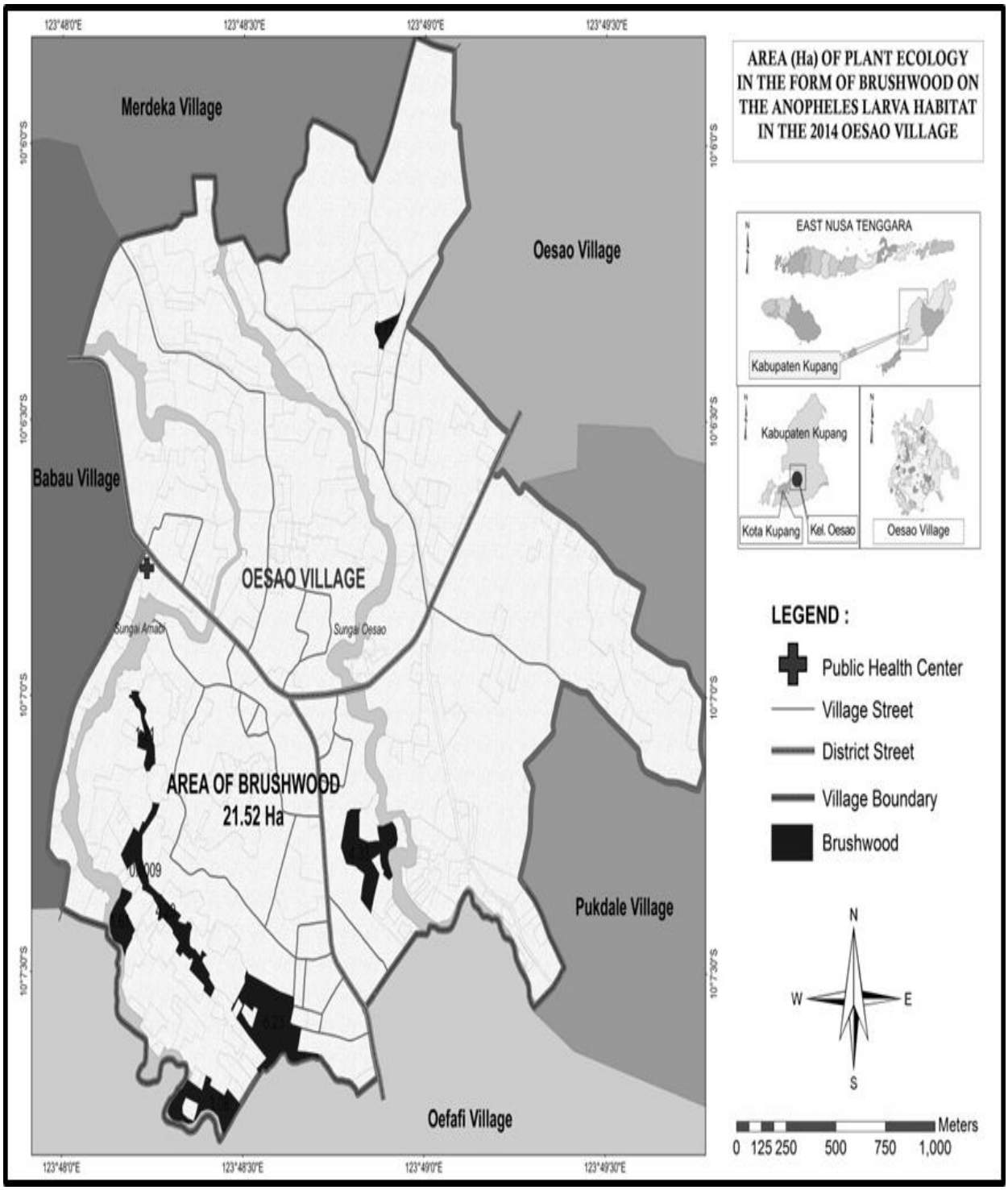

Figure 6. A map of forage plants and the land area in Oesao Village in 2014

From the illustration of the distribution of cases on the map (Figure 7), the spread is evenly distributed, and the types of plasmodium are falciparum and vivax.

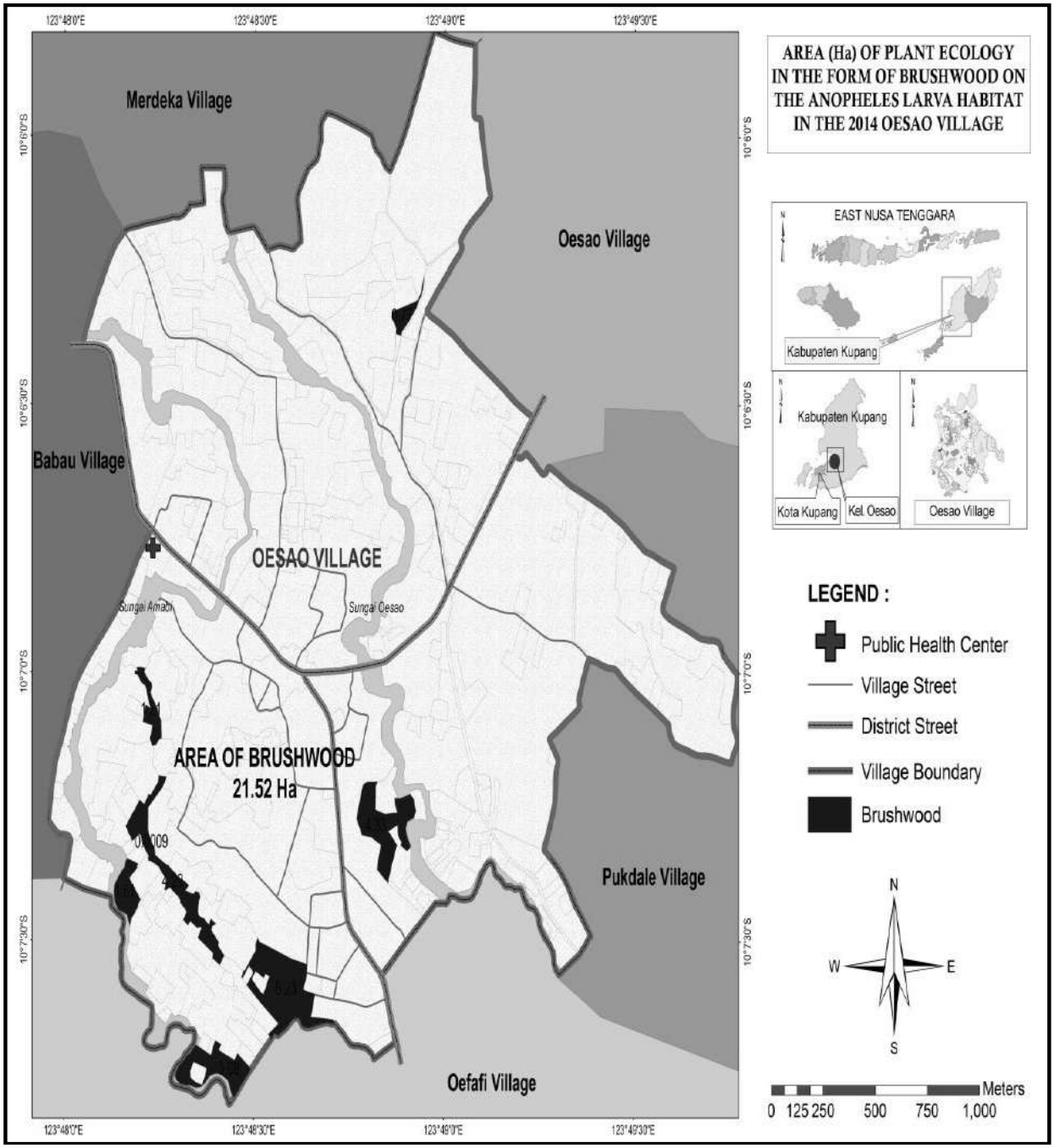

Figure. 7 A map of the distribution of malaria cases and the ecology of vegetation in Oesao District, Kupang Regency

DISCUSSIONS

Ecological Vegetation Mapping

The ecology of vegetation is a community of plants according to their types and distributions that support the vectors breeding and growth of *Anopheles* mosquitos, particularly as resting sites and producers of oxygen supply (O_2) contributing to the survival of mosquitos and other living organisms.

In general, there is a relationship between the plant habitat, types of plant, also the area of arable field on the growth and proliferation of *Anopheles* mosquitos[2]. For some types of plants in arable lands such as rice, kale, root tubers, grasses, blushes, and shrub, they become

very suitable habitats or resting sites for *Anopheles* sp mosquitos. Based on the research results, the researcher found an average of one to three larvae in a cup of water in the arable area. Geographically, rice paddy is the largest cultivation area in Oesao district. This is so, for the soil structure and rainfall intensity of Oeasao district are suitable for the rice cultivation. Therefore, it reasons out why most Oeasao people choose rice cultivation as the main source of their livelihood.

Theoretically, the ecology and area of rice paddy in Oesao district including irrigation canals and standing water along with grass as its protector make them suitable sites for *Anopheles* mosquitos breeding. In addition, another factor that supports proliferation of *Anopheles* mosquitos is the temperature of water in the Oesao's rice paddies. The result of measurement showed that the average of water temperature in the arable area is 29.37 °c. The water temperature was measured in the peak of dry season with very hot ambient temperature. The optimum temperature for *Anopheles* mosquitos' proliferation is 26°C up to 30°C[2]. Another reference says that the optimum temperature for the growth and proliferation of mosquitos is 20°C up to 30°C[5]. In addition, pH measurements in the rice paddies also demonstrated nominal values ranging from 6.6 to 6.98. However, according to the book published by Department of Health, 2017, "Ecology Malaria Vector", it is stated that the optimum pH for larvae's development is 6 - 8.

The researcher found another fact that in the ecology of Oesao District there are all types of plants ranging from groups of forages (including grass and shrub), vegetables (mustard, kale, eggplant, sweet potato, cassava), rice crops (rice paddy), high-tree plant species (coconut and banana trees), to forest areas (green fields). Some experts suggest that vector growth is inextricably linked with the number and type of plants. The land and plants area affect the growth and proliferation of *Anopheles* mosquitos. The wider and the more diverse the types of plants, the better for the mosquitos' proliferation than the dry and barren areas.

From the environmental aspect, pH and temperature provide positive contributions to the growth and breeding of mosquitos. Moisture level and adequate rainfall intensity per year also support such conditions to strive. Concerning the book published by UNICEF in 2012, "Malaria, Immunization and Integrated KIA (Maternal and Child Health)", geography and meteorology factors such as temperature, humidity, rain, and altitude are very beneficial to malaria transmission in Indonesia. These are the major factors that explain why malaria case in Oesao district is very high.

Mapping of the Mosquito Breeding Sites (Larvae Habitats)

The illustration of map on larval habitats comprises of 5 habitat types: rice paddies, swamps, rivers, irrigations, and dams. The mosquito breeding sites in rice paddies are the standing water and the water in irrigation canals that flow continuously on edge of the rice paddies. Based on Figure 1 above, the rice paddies become the largest area of the mosquito habitat compared to other larval habitats; the size of rice paddy is 165.03 Ha. The researcher classifies rice paddies into two roles: (1) as plant ecology and (2) as habitat of malaria mosquito breeding sites. In the discussion above, the rice paddy is closely related to the bionomic life of malaria mosquitos.

Previous studies found that the best resting places for adult mosquitos are areas in rice paddies like terraces, and edges. These places are suitable sites for adult mosquitos since they are not far from water puddles, water drains, irrigation canals of rice paddies, so that adult mosquitos can easily put their eggs in water anytime[4]. Beside rice paddies, the other larval habitats are water dams, swamps, irrigation canals, and rivers. Nevertheless, all types of habitats mentioned above are very suitable for the growth and proliferation of *Anopheles* mosquitos.

From the above map, it appears that all potential habitats for the growth and proliferation of *Anopheles* mosquito larvae reside in this region, with a large enough area.

Distribution of Malaria Cases

After combining the data of ecological vegetation with the previous data of the mapping, and mosquito breeding sites (larval habitat), the result revealed that the spreading of malaria patients in Oesao district was distributed evenly. Based on spatial mapping, it is clearly illustrated that the main factors that contribute to the growth and proliferation of larvae and malaria mosquitos are the number and types of plants, the area of arable land, pH and temperature of the malaria mosquitos' breeding sites, and also the types of the breeding sites.

To ensure the relationship or influence of these three factors, a more in-depth analytical research needs to be conducted in the future; 232 such as the analysis based on the demographic characteristics, the mobility of sufferers, etc.[6].

CONCLUSION

Ecology of plants by type consisting of 5 types of plants are dominant, namely: crop rice (paddy), maize crops, vegetable crops, coconut and banana plants, plant shrubs and grass and forest plants. Plant ecology are quite varied in the Village Oesao, as well as extensive areas of the plant that is closely linked to inadequate growth and development of mosquitoes as well as species specific anophelles that kind of *An. vagus* and *An. annularis*.

Conflict of Interest: None

Ethical Clearance Certificate: Ethical Committee of Faculty of Public Health, Airlangga University.

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REFERENCES

1. World Health Organization. World Malaria Report 2011. Geneva; 2011.
2. Ministry of Health of Indonesia. Guidelines for Malaria Case Management in Indonesia (Pedoman Penatalaksanaan Kasus Malaria di Indonesia). Dirjen P2PM Kemenkes RI. Jakarta ; 2013.
3. Dinkes Prov. NTT. The Annual Report of Nusa Tenggara Timur Province (Laporan Tahunan Propinsi NTT). Kupang: Dinkes Prov. NTT; 2011.
4. Kristina RH, Rogaleli Y, Sadukh JP. Fauna Study of *Anopheles sp*. in Rice Fields in Oesao Village, East Kupang District, Kupang Regency, NTT Province in 2011 (Studi Fauna Nyamuk *Anopheles sp*. pada Daerah Persawahan di Kelurahan Oesao, Kecamatan Kupang Timur, Kabupaten Kupang, Propinsi NTT Tahun 2011). Prosiding Kongres Nasional dan Seminar Internasional, Epidemiologi Sosial dalam Mendukung Pelayanan Kesehatan Primer. Surakarta: FK-UNS; 2011.
5. Unicef Kupang. Books on Integrated Malaria, Immunization and MCH (Buku Malaria, Imunisasi, dan KIA Terpadu). Kupang; 2012
6. Sillehu S, Nugroho HSW, Umasugi MT, Saraswati LD, Ginandjar P. Malaria in Open and Closed Communities in Namrole, Buru Selatan District, Maluku Island, Indonesia. Indian Journal of Public Health Research and Deveopment (IJPHRD. 2018;9(2):220-225.

Barriers in Treating Patients with Acute Coronary Syndrome in Indonesia Primary Health Care: A Phenomenological Study

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ABSTRACT

Introduction: Acute Coronary Syndrome (ACS) is the leading cause of mortality in the world. Primary prevention strategy focuses on reducing the risk of disease spread. At the same time, curative strategy aims at reducing the risk of disability and mortality. Initial therapy should be considering early stabilization and immediate advanced care to reduce the risk of complication. Therefore, it is important to improve guidelines, the medical referral system, and family consent procedure to save patients with ACS.

Aim: This research aimed at exploring the barriers faced by nurses in treating patients with ACS in Primary Health Care (PHC).

Method: This research employed a qualitative research method using descriptive phenomenology.This study involving 16 subjects of nurses working in PHC with indepth interview . The data analysis procedure proposed by Clark and Brown 2013.

Result: Three main themes were pointed out by 16 participants; 1) Update Guidlines, 2) Inefficient referral process to other health centers, 3) Consent making process by the family.

Dicussion: Barriers in performing health care for patients with ACS in the emergency unit of PHC needs updating guidline to be enhanced by engaging the advancement of technology and communication using electronic medical record system, family education, and fulfillment of better medical facilities to make the process more efficient. At the same time, also improves the management service for patients with ACS and making it possible for PHC to provide reliable health care as the first health care provider for the society.

Keywords: *Barriers to care, Health Care Referral, Acute Coronary Syndrome, Emergency Nursing, Primary Health Care*

INTRODUCTION

Acute Coronary Syndrome (ACS) refers to a condition or complication of diseases which cause unstable condition caused by burst of blood vessels, causing sudden occlusion in the coronary artery.[1] According to the data released by the WHO (2008), acute coronary syndrome is the world's top killer and causes death twice as much as cancer.[2] Record shows that around 7.200.000 people (12.2%) have died of ACS.The chance in rescuing patients with cardiac arrest declines around 7-10% every minute.[3] Based on the data released by the European Society of Cardiology (ESC) on the guideline,initial stabilization procedure within the first 72 hours for patients who have low risk of complication.[4]

Primary Health Care (PHC) attempts at providing responsive, comprehensive, effective and efficient that decreases the expenses of inpatient care and reduces the health gap in the society in order to let anyone have the access to reach excellent health service at affordable price. PHC in Indonesia is a first-level health service in peripheral areas development in health services. There

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are fullfill of 20 million with rate 70% -90% in the population with health problems. This problem should be taken as a challenge for PHC to improve its service and facilities.[5] A study conducted in New Zealand shows that generally nurses always try to apply nursing principles while they are performing their jobs.[6] The role of PHC nurses in Indonesia performs health promotion, screening and treatment of general emergency diseases.

PHC service In treating emergency patients, referral procedure should be highly concerned, regarding to the fact that the distance to more advanced hospitals is quite far, and ineffective communication procedure as well as the lack of facilities might appear as the barriers during the process. At the same time, primary treatment that focuses on decreasing the risk and reduce of ACS. Whilst, curative strategy should also be given to decrease the risk of disability and death. Patients who felt the symptoms of cardiac diseases need deep investigation and immediate treatment, chest pain not always caused by ACS.[7] Barriers in this process needed to be determined regarding to the fact that families of the patients might be lacking of knowledge to take immediate consent, nurses might also lack of experience and skills, as well as limited resources, accessibility issues and inefficient referral procedure.[8] Some indicators are used to evaluate the quality of emergency treatment including nurses' emergency nursing experience, medical facilities and trainings given to deal with emergency patients.[9] A study conducted in Sri Lanka also shows that poor communication.[10] The result of this study is expected to give insights in solving the problems and improving the referral system across health care providers as well as advancing the facilities in PHC.

MATERIAL & METHOD

Research Design

A qualitative approach using a descriptive phenomenology design was employed in this study. The result of this study describes nurses' view about their nursing experiences related to certain concept or phenomena.

Setting

This reseach took place in Primary Health Care, Malang Regency, East Java, Indonesia.

Population and samples

For this study were selected by snowball sampling. Criteria of selection were that participant 16 nurse at PHC who owned 3-15 years nursing experience and minimal had 1 year experience treatment patients with ACS. 16 nurses possessed diploma degree in nursing and bachelor of nursing. All of the participants joined several professional trainings such as Basic Cardiac Life Support (BCLS).

Data Collection Instrument

In-depth interviews were done to collect data in which voice recorder was used to help the researchers in recording the complete data. The semi-structured in-depth interviews were conducted based on critical decision method using a set of open-ended questions, allowing the participants to give in-depth and broad explanation about their views.

Procedure

This research was conducted for 4 months from September to December 2017. Researchers acted as the key instrument in this study. After being given the explanation, the participants were asked to sign a consent for. Researchers scheduled the exact time and place for the interview.

Data Analysis

The data obtained from the interview were transcribed to be later analyzed using the thematic method proposed by Clark and Brown (2013).[11] The thematic data analysis consisted of these steps: (1) transcribing; (2) identifying the data; (3) coding; (4) grouping the key words into sub-theme categories; (5) arranging the themes; (6) writing the report of data analysis which contained nurses' explanation about their experience that could not be analyzed using software.

Ethics

Ethical clearance procedure was administered and legalized by the board of ethics of the Medical Faculty, Brawijaya University number 216/EC/KEPK/06/2017.

Finding

The participants (nurses) selected for this research were 20–35 aged and had been working in the ED for 3-15 years. In the term of education background, it was obtained that participants almost were diploma in nursing graduates while the other 4 had Bachelor's degree

in Nursing. Participants have training certifications of BCLS. According to the results of the qualitative data analysis,there are three themes obtained based on the objective of the research.

Theme 1: Update Guidelines

The sub theme is update of ACS management SOP The update is done by updating, replacing, adding, or subtracting. With the updated guidelines, nurses have a sense of calm in performing the action.

I have ever known the guideline, but yaa, you know, sometimes patients in EDs have different characteristics. Whether the ED is crowded (full of patients) cannot be ascertained, we will try to take care of him accordingly with the guideline... (P9)

In my opinion, the SOP should be upgraded in accordance with the scientific development and adjusted to the policy. The existing SOP may be replaced, added, or subtracted (P11,P16)

Theme 2: Inefficient referral process to other health centers

The sub theme are The communication network among health care providers, Barriers in transferring the patients to more advanced hospitals. the need for equipment availability, and Additional duties.

We desperately looked for referral hospital but it took quite a while. Patient's condition dropped. Unfortunately, 30 minutes was not enough to save the patient.(P6)

We always called the referred hospitals, usually we contacted the regional hospitals but sometimes it was not easy to reach them. So we had to bring the patients to RSSA (Saiful Anwar Hospital) which is quite distant. (P1, P3)

When the EKG record indicates IMA case, we directly refer the patient to a more advanced hospital. But the referral process can only be granted by ACS group. Thus, we always have to consult the case to cardiologists before it is granted. Usually, we contacted the cardiologists via telephone. Sometimes they did not grant the requests and we could not do anything.(P7)

...no oxygen saturation tester available. So, nurses collected their own money to buy it in order to save the patients with heart disease indication.(P5, P14)

We already propose for the equipment which has been months and years, but there is no response ....(P10,P15)

Actually, I tend to respond it as a part of the delegation or responsibility that we have to commit. But, it cannot be denied that such duties will increase our workload... (P13)

Theme 3: Consent making process by the family

The sub theme are Family rejected tranffering patient and Family rejected medical treatment

Sometimes, conflicts occurred. Families insisted on staying here even if the patients agreed to be transferred to regional hospitals. Families wanted to stay in nearby hospitals.(P12, P2)

Families might not understand the condition of the patients. They stuck to their own assumption to tranfer advanced hospital. They underestimated the patients' condition. (P4)

There were families who rejected the heart resuscitation procedure because they felt terrible to the patients. They might have watched the procedure on television and they assumed most of the procedure failed.(P8)

DISCUSSION

Transition in Epidemiology has changed the paradigm that believed non-contagious diseases could not be the major cause of mortality. Nurses in PHC hold the responsibility to give pre-hospital emergency health treatment which requires them to have adequate human resources and excellent coordination and communication among the personnels.[10] Patients lives are the top priority of the SOP, allowing the nurses to change treatments in order to minimize any live-threatening risks.[12]

The results of the interviews showed some barriers, first: guideline ineffective, the lack of medical tools or devices, delegation tasks or additional make nurse work overload, such as taking transporter actions and handling administrative. According Deaton (2016) that study found the nurses who have some barriers yet still showed a high level of responsibility for patients by maintaining their care quality despite those emerging barriers.[13] Therefore, the nurse practice guidelines renewal is important to be done to improve the quality and service. SOP development is an effective tool

to improve the quality of service and documentation completion, so also avoid heavy workload.[14]

Referral to other health care facilities requires a strategic, pragmatic, even, and coordinative system to provide a continuum health care from the first health facility to a more advanced health facility. This theme describes that crucial issue is related to the lack of knowledge, skills, resources and accessibility that also affect the efficiency of the referral process.[8] There has to be a good integration in the communication system between PHC and regional hospitals to make the process faster. However, some nurses stated that sometimes negative responses due to disagreement from ACS consultant group in the regional hospitals. Studies show that as many as 67% of the population reported poor accesibilty to reach advanced health services in rural areas compared to urban areas.[14,15] Vast advancement of technology makes it possible to create innovations in medical treatment system. Excellent integration of advanced information, communication and technology allows betterment in information system which guarantees information continuity, quality service, medical treatment, and better access for people who live in outskirt areas. The innovations can be made in the form of electronic medical record system and telemedicine.[16] Beside that lack of facilities like equipment at PHC, nurses often had to make their own donation which reflects their sincerity to their patients to buy some equipment needed because limited and it would take quite. Oxygen saturation tool is an important tool to measure the oxygen level in patients' blood and shows the risk of heart attack. This deficiency is associated with budget constraints which will have an impact on service quality.[17]

According to the interview, they agree that family as decision making. Families are the closest relatives of patients. Any treatment given to the patients should be agreed by the family at first by signing the inform consent.This procedure also reflects the legal ethical even in emergency situation, such as informed consent like two-way communication between patient and one or more health practitioners which patients should be given the rights benefits and risks treatment.[18] Any medical treatment should not be given when in a sensitive and difficult condition either or not to take life-saving treatment such as cardiopulmonary resuscitation (CPR) even if this treatment might save patients' lives.[19] New Zealand has a complete set of patients' basic rights which involves the participation of the patients, patients' family and medical practitioners in deciding the medical treatment. Meanwhile, in some Asian countries, there is a cultural-bond phenomena in which the family hold the strongest authority. Nursing ethics require the nurses to reach this balanced decision by solving the problems related to family consent.[20]

CONCLUSION

In this study, nurses who participated in this study have explained the problems. Three major problems appear as the barriers during the treatment. These problems can be solved by implementing an advanced integration of technology in the communication system such as using electronic medical record system and guidline of nurse need updating, educating patients' family and the management of health care service, especially for patients with ACS.

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Limitation: This research explains the Barriers found by nurses of PHC in peripheral areas of Indonesia. The result of this study cannot be simply generalized for other areas.

Implications for further research

Implication for future researchers to design guidelines for PHC services by implementing network-based referral system and using electronic medical record system to provide better emergency nursing in PHC services.

Conflict of Interest: No conflict of interest involved in this research.

REFERENCES

1. Grange J. The role of nurses in the management of heart failure. 2005;(Mi):39–43
2. Wireklint Sundström B, Holmberg M, Herlitz J, Karlsson T, Andersson H. Possible effects of a course in cardiovascular nursing on prehospital care of patients experiencing suspected acute coronary syndrome: a cluster randomised controlled trial. BMC Nurs [Internet]. 2016;15(1):52. Available from: http://bmcnurs.biomedcentral.com/articles/10.1186/s12912-016-0175-1

3. Aringhieri R, Bruni ME, Khodaparasti S, van Essen JT. Emergency medical services and beyond: Addressing new challenges through a wide literature review. Comput Oper Res [Internet]. 2017;78 (July 2015): 349–68. Available from: http://dx.doi.org/10.1016/j.cor.2016.09.016

4. Laurencet M, Girardin F, Rigamonti F, Bevand A, Meyer P, Carballo D, et al. Early Discharge in Low-Risk Patients Hospitalized for Acute Coronary Syndromes: Feasibility, Safety and Reasons for Prolonged Length of Stay. 2016;45:1–13

5. Wihastuti TA, Rachmawati SD, Kumboyono K, Harista DR, Lestari YC, Rahmawati I, et al. Qualifications of Emergency Nurse in Caring the Acute Coronary Syndrome Patient: The Perspective of Rural Hospitals in Indonesia. Indian Journal of Public Health Research & Development. 2018; 9(9): 340-345

6. Carryer J, Adams S. Nurse practitioners as a solution to transformative and sustainable health services in primary health care : A qualitative exploratory study. Collegian [Internet]. 2017;24(6):525–31. Available from: https://doi.org/10.1016/j.colegn.2016.12.001

7. Carryer J, Halcomb E, Davidson PM. Nursing : the answer to the primary health care dilemma. Collegian [Internet]. 2015;22(2):151–2. Available from: http://dx.doi.org/10.1016/j.colegn.2015.05.001

8. Farokhzadian J, Khajouei R, Ahmadian L. Information seeking and retrieval skills of nurses : Nurses readiness for evidence based practice in hospitals of a medical university in Iran. Int J Med Inform [Internet]. 2015;84(8):570–7. Available from: http://dx.doi.org/10.1016/j.ijmedinf.2015.03.008

9. Wolf LA, Perhats C, Delao AM, Clark PR, Michael D Moon. On the treshold of safety: a qualitative exploration of nurse perceptions of factor involved in safe staffing level in emergency department. J Emerg Nurs [Internet]. 2013;1–8. Available from: http://dx.doi.org/10.1016/j.jen.2016.09.003

10. Landefeld J, Sivaraman R, Arora NK. Barriers to Improving Patient Safety in India : Focus Groups with Providers in the Southern State of Kerala. 2015;40(2):116–21.

11. Clarke, V. and Braun, V. (2013) Teaching thematic analysis: Over- coming challenges and developing strategies for effective learning. The Psychologist, 26 (2). pp. 120-123. ISSN 0952-8229 Available from: http://eprints.uwe.ac.uk/21155

12. Chen C, Kan T, Li S, Qiu C, Gui L. American Journal of Emergency Medicine Use and implementation of standard operating procedures and checklists in prehospital emergency medicine: a literature review. Am J Emerg Med [Internet]. 2016;34(12):2432–9. Available from: http://dx.doi.org/10.1016/j.ajem.2016.09.057

13. Deaton, C., Johnson, R., Evans, M., Timmis, A., Zaman, J., Hemingway, H., … Cramer, H. (2017). The role of nurses in the care of patients with non-ST elevation myocardial infarction. Nursing Open, *4*(1), 49–56. https://doi.org/https://doi.org/10.1002/nop2.69

14. Nicolae, S. (2014). Standard operating prosedures (SOP) in emergency situations management in health system. *Manaj Heal*, *XVIII*(4), 14–6

15. Mathiesen WT, Bjørshol CA, Braut GS, Søreide E. Reactions and coping strategies in lay rescuers who have provided CPR to out-of-hospital cardiac arrest victims: A qualitative study. BMJ Open. 2016;6(5):1–9

16. WHO. Framework on integrated , people - centred health services. 2016 p. 1–12.

17. Ernst, C., & Szczesny, A. (2008). Capped hospital budgets, risk-influencing activities and financial consequences. Journal of Accounting and Public Policy, 2*7*(1), 38–61. https://doi.org/10.1016/j.jaccpubpol.2007.11.002

18. Scott C, Hofmeyer A. Health Research Policy and Systems Networks and social capital : a relational approach to primary healthcare reform. 2007;8:1–8

19. Vahdat S, Hamzehgardeshi L, Hessam S, Hamzehgardeshi Z. Patient Involvement in Health Care Decision Making : A Review. 2014;16(1):1–7

20. Babcock R. Medical Decision-Making for Minors : Using Care Ethics to Empower Adolescents and Amend the Current Power Imbalances. Asian Bioeth Rev. 2016;8(1):4–19

Association between Papilledema and Guillian - Barré Syndrome

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ABSTRACT

Background: Guillain barre syndrome is monophasic acute polyradiculoneuropathy autoimmune in nature, it appears as rapid developing areflexia and motor weakness with or without sensory and autonomic disorder, it reaches nadir in less than 4 weeks. Papilledema is rare and usually asymptomatic finding in patient with GBS, the CSF protein is usually elevated in GBS with papilledema, and high protein level will cause a disorder in the appropriate absorption of CSF at the arachnoid villi.

Aim of the study: To determine the percent of papilledema in GBS, the causes of papilledema in GBS, the correlation of papilledema to different clinical presentations of GBS.

Patients and method: A cross sectional study was made on seventy patients who have GBS during 4 weeks hospitalization, males are thirty seven and females are thirty three, that admitted to neurological ward and Respiratory Care Unit in Baghdad Teaching Hospital between 1st January- 2017 to 1st January- 2018. All patients were newly diagnosed by consultant neurologist and selected according to criteria by Asbury and Cornblath 1990 and meet with Brighton Collaboration Diagnostic Criteria Level 1and 2.Regarding patients who have papilledema diagnosed by consultant neurologist by fundoscopic examination and supported by consultant ophthalmologist by slit lamp examination .

Results: There is a correlation between GBS and papilledema, in this study 3 patients had papilledema, the percent of papilledema in GBS was (4.29%) and the cause appears to be high CSF protein.

Conclusions : Regarding the patients who had elevated CSF protein, there is significant association between the presence of papilledema and need for mechanical ventilation. There is more correlation between AIDP and papilledema as compared with (AMAN, AMSAN).

Keywards: *Gullian berre syndrome, papilledema, cerebrospinal fluid protein, Acute inflammatory demyelinating Polyneuropathy.*

INTRODUCTION

Guillain Barré syndrome is an acute monophasic polyradiculoneuropathy autoimmune in nature. It manifests as rapidly evolving areflexic motor paralysis with or without sensory disturbance and autonomic manifestation. The usual pattern is an ascending paralysis, it may be severe and fulminant[1] .Two-thirds of patients can recall a preceding illness, most frequently upper respiratory in 58% or gastrointestinal infection in 22%, respiratory and gastrointestinal illness in 10%, surgery in 5%, or immunization 1 - 4 weeks before the onset of neurological symptoms in 3% [2]. its begins commonly with acroparesthesia, followed 7–10 days later by symmetric ascending type weakness, associated with severe radicular pain in up to two thirds of patient, proximal and distal weakness is usually the predominant feature, Hyporeflexia or areflexia may be delayed one week. Most reach weakness nadir by 2 weeks, but 80% by 3 weeks and 90% by 4 weeks, The disease ranges from mild weakness to flaccid quadriplegia and up to

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one-third progress to respiratory failure, AIDP accounts for 80% of GBS cases,CSF protein is elevated in most patients[3].

Protein elevated in 90% in the absence of white blood cell elevation (less than 20 per mm^3), called albuminocytologic dissociation, CSF protein elevation may be delayed; a repeated lumbar puncture in 5 to 7 days may be supportive of the diagnosis,CSF pressure typically normal but may be raised and high protein cause papilloedema [4] .

Papilledema mean optic nerve head swelling caused by increased intracranial pressure with absent spontaneous venous pulsations, usually bilateral but may be asymmetric[5] .It is primarily due to a rise of pressure in the optic nerve sheath, which produces axoplasmic flow stasis in the optic nerve fibers in the surface nerve fiber layer and prelaminar region of the optic nerve head, Axoplasmic flow stasis then results in swelling of the nerve fibers, and consequently of the optic disc, Swelling of the nerve fibers and of the optic disc secondarily compresses the fine, low-pressure venules in that region, resulting in venous stasis and fluid leakage; that leads to the accumulation of extracellular fluid[6]. Papilledema caused by brain mass like tumor or pseudotumor include: Idiopathic intracranial hypertension, cerebral venous thrombosis, meningeal diseases include infections, gliomatosis cerebri, drugs include hypervitaminosis A, administration or withdrawal of corticosteroids, metabolic disturbances, hyper- and hypoadrenalism, myxedema, hypoparathyroidism, GBS, spinal tumor such as oligodendroglioma, systemic lupus erythematosus, severe systemic hypertension, and hypersecretion of CSF by a choroid plexus tumor [7] **.**

Papilledema and raised intracranial pressure have been reported in association with GBS, The cerebrospinal fluid protein is usually reported to be high. In most of these reports the papilledema appeared after established limb weakness and very rare the papilledema preceded the limb weakness, These elevated proteins will cause a defect in the proper absorption of CSF at the arachnoid villi, giving rise to increase intracranial pressure[8].

The Pseudotumor cerebri also been rarely reported with (AIDP), where the CSF protein level was normal and papilledema develop [8].The papilledema in patients with Guillain Barré syndrome may be very rarely secondary to cerebral edema and hypernatremia [9].

Aim of the study: To determine the percentage and causes of papilledema in GBS, correlation of papilledema to different clinical presentations of GBS.

Patients and methods:

A cross sectional study was made on seventy patients have GBS during 4 weeks hospitalization, who were admitted to neurological ward and Respiratory Care Unit of Baghdad Teaching Hospital between 1st of January- 2017 to 1st January- 2018. The age of patients ranged from 18–75 years, males are thirty seven and females are thirty three. All patients gave their consent to participate in the study.

The inclusion criteria: All patients selected according to criteria by Asbury and Cornblath 1990, and meet with Brighton Collaboration Diagnostic Criteria Level 1and 2 [10,11] .All patients were newly diagnosed by consultant neurologist and were investigated by Electromyography and Nerve Conduction Studies, CSF opening pressure and analysis was done after at least seven days from the onset of the disease. All patients who had papilledema were diagnosed by consultant neurologist by fundoscopic examination and classified according to Frise´n Papilledema Grading Scale, supported by consultant ophthalmologist by slit lamp examination and Optical Coherence Tomography (OCT) to excluded pseudopapilloedema and to approve finding.

The exclusion criteria: The patients with secondary causes of papilledema.[7] .The following investigations were done for every patient with papilledema to exclude secondary causes:1-Brain and Spine Magnetic Resonance Imaging (MRI)**,** Magnetic Resonance Venography (MRV) .2-CSF pressure and analysis.3-Serum calcium and sodium.4-Liver and renal function test.5-Complete blood count, erythrocyte sedimentation rate and C reactive protein.6-Antinuclear antibody, anti-double stranded DNA antibody, lupus anticoagulant, anticardiolipin antibody.

Statistical analysis: SPSS 20.0.0 software package applied to do the statistical analysis, p value considered when suitable to be significant if less than 0.05.

RESULTS

In this study, the age of patients range from (18-75) years with mean age of (36.1 ±16.2) years, 33 (47.1%) are female while 37 (52.9%) of patient are male.

Forty four patients had antecedent infection (few weeks) preceding onset of the weakness, being most frequent respiratory tract infection (RTI) in 33 (47.1%), diarrhea in 7 (10.0%) of patients and 26 (37.1%) of patients had no previous infection.

The sensory symptoms was obsereved in 45 patients(64.3%),bulbar involvement in 24 patients (34.3%),involvement in 18 respiratory patients (25.7%),requirement for mechanical ventilation in 10 patients(14.3),facial weakness in 29 patients (41.4%),as shown in table 1

Three patients (4.29%) of GBS developed papilledema, while the remaining 67 (95.71%) did not had papilledema,as illustrated in table 2.

In the current study three cases had papilledema, two of them male and one female were presented below are their characteristics, which in summary; 2/3 had grade 2 papilledema presented within the 3rd week, with 1/3 presented in the 2nd week had grade 1 papilledema. All three cases were asymptomatic, as illustrated in table 3.

There was no significant difference in age, gender, limb weakness, sensory symptom, bulbar weakness, respiratory involvement, requirement for mechanical ventilation, bifacial weakness and cells in CSF among patients presented with or without papilledema. On the other hand, the CSF protein level and pressure was significantly elevated in GBS with papilledema compared to those without, with p value (0.004),(0.001) respectively, as illustrated in table 4.

In this study 47(67.1%)of patients had high CSF protein level ,there was no significant difference in age ,gender and various presentations (limb weakness ,sensory symptoms ,bulbar weakness, respiratory involvement and bifacial weakness)among patients presented with or without papilledema w, but on other hand there was significant association between requirement for mechanical ventilation and patient had papilledema with p value (0.016), as illustrated in table5.

In the current study four cases were AMAN and two cases were AMSAN, the CSF protein was lower than that in patients with (AMAN, AMSAN) compared to those with AIDP with p value (0.002), Odd Ratio (0.978) and 95% Confidence Interval (0.955–0.999), i.e. there is negative relationship between CSF protein level and axonal variant (AMAN, AMSAN), as illustrated in table 6.

Table 1: Demographic and clinical characteristics (Descriptive data).

Variables	Value
Age (years), mean ± SD	36.1 ± 16.2
Gender, number (%)	
Female	33 (47.1%)
Male	37 (52.9%)
Antecedent infection, number (%)	
Respiratory tract infection (RTI)	33 (47.1%)
Diarrhea	7 (10.0%)
Others	4 (5.7%)
Negative	26 (37.1%)
Presentation	
MRC score of Limb weakness, mean ± SD	35.8 ± 10.5
Sensory Symptom, number (%)	45 (64.3%)
Bulbar involvement, number (%)	24 (34.3%)
Respiratory involvement, number (%)	18 (25.7%)
Requirement for mechanical ventilation, number (%)	10 (14.3%)
Bifacial weakness, number (%)	29 (41.4%)
Time of CSF aspiration (days), mean ± SD	8.7 ± 1.4

Table 2: Frequency of papilledema in GBS patients (n=70).

	NO.	%	95%CI
papilledema	3	4.29	3.81 – 4.76%
No papilledema	67	95.71	-

Table 3: Characteristic of the patients with papilledema.

ID	Timing	Grade	CSF pressure	CSF protein	CSF	Fate of
			(up to 250mm	(up to 45 mg/dl)	WBC	papilledema
			H2o)			after 3
						months
1	3rd week	Grade2	240	220	1	Recover
2	3rd week	Grade2	220	205	2	Recover
3	2nd week	Grade1	220	210	4	Recover

Table 4: GBS patients compared according to presentation with or without papilledema (n=70).

Variables	No papilledema	Papilledema		P value
	(n=67)	(n=3)		
Age (years), mean ± SD	35.33 ± 5.03	36.12 ± 16.49		0.935
Gender				0.599
Female	31 (46.3%)	2	(66.7%)	
Male	36 (53.7%)	1	(33.3%)	
Presentation				
MRC score of limb	44.00 ± 3.46	35.40 ± 10.62		0.169
weakness, mean ± SD				
Sensory Symptom	42 (62.7%)	3	(100.0%)	0.548
Bulbar weakness	22 (32.8%)	2	(66.7%)	0.269
Respiratory involvement	16 (23.9%)	2	(66.7%)	0.160
Requirement for	8 (11.9%)	2	(66.7%)	0.052
mechanical ventilation				
Bifacial weakness	26 (38.8%)	3	(100.0%)	0.067
CSF analysis				
Pressure, mean ± SD	168.43 ± 29.19	226.67 ± 11.55		0.001
Protein level , mean ± SD	108.79 ± 59.11	211.67 ± 7.64		0.004
Cells, mean ± SD	2.33 ± 1.53	1.64 ± 2.33		0.298
EMG study				
Demyelinating	61 (91.0%)	3 (100.0%)		1.0
Axonal	6 (9.0%)	0 (0.0%)		

Table 5: High CSF protein level GBS patients compared according to presentation with or without papilledema (n=47).

Variables	No papilledema (n=44)	Papilledema (n=3)	P value
Age (years), mean ± SD	34.36 ± 16.25	35.33 ± 5.03	0.919
Gender			0.579
Female	19 (43.2%)	2 (66.7%)	
Male	25 (56.8%)	1 (33.3%)	
Presentation			
MRC score of limb weakness, mean ± SD	36.00 ± 10.20	44.00 ± 3.46	0.166
Sensory Symptom	29 (65.9%)	3 (100.0%)	0.541
Bulbar weakness	13 (29.5%)	2 (66.7%)	0.235
Respiratory weakness	8 (18.2%)	2 (66.7%)	0.110
Requirement for mechanical ventilation	2 (4.5%)	2 (66.7%)	0.016
Bifacial weakness	18 (40.9%)	3 (100.0%)	0.082

Table 6: Correlation between CSF protein level and GBS variant types.

	(AIDP)	(AMAN,AMSAN)	OR	95%CI	P value
Protein level	118.2 ± 61.7	59.5 ± 22.6	0.978	0.955–0.999	0.002

DISCUSSION

In this study there was association between Guillain Barré syndrome and papilledema, the percentage of papilledema in Guillain Barré syndrome was (4.29%). This agree with study done by Karkare in Bangalore (India) on sixty patients with Guillain Barré syndrome who found the percentage of papilledema was (3.3%)[12]. And consisted with the Turkish study done by Güngör on thirty-two Guillain Barré syndrome patients which found the percent of papilledema was (3.1%)[13]. And also similar to the percent of papilledema in Guillain Barré syndrome reported by Canadian Ophthalmological Society 2015 which confirm the papilledema detected in (4%) of Guillain Barré syndrome cases[14].

In this study three cases were reported with papilledema, regarding the causes of papilledema in GBS, this study found that the CSF protein level and pressure was significant elevated in Guillain Barré syndrome with papilledema compared to those without. In the current study not all patients had high CSF protein, only (67.1 %) of the patients had high CSF protein level during first 2 weeks of disease, this agree with study done by Massachusetts General Hospital (Boston) on 110 patients with GBS which found the CSF

protein elevations in (73 %) of patients[15]. And agree with the Indian study done by Kalita between 2000 and 2012 on 328 Guillain Barré syndrome patients who found (68%) had CSF albuminocytological dissociation [16]. The possible explanation of high CSF protein was increase in permeability of the blood – nerve – barrier due to inflammation of the proximal nerve roots, thus will lead to defect in absorption of CSF at arachnoid villi and increase ICP[8].

Regarding other clinical feature of GBS in patients with papilledema, the follow up (after 3 months) also showed complete resolution of these finding, this agree with usual outcome of disease in general which was reported by Biomed Central Neurology in United Kingdom (BMC) 2013 in which (87%) of GBS experience full recovery [17].

This study showed there is significant correlation between (CSF Protein level and CSF pressure) with time of CSF aspiration, the CSF protein level and pressure increase with time, this agree with Turkish study by Sahin carried out between 2011 and 2015 on 24 patients in which the CSF Protein level could be normal in first week and start to elevated after that in 2nd and 3rd week [18] .And since the cause of papilledema is the high CSF protein, so give impression for increase possibility to find papilledema with time of disease progression.

CONCLUSIONS

There is correlation between GBS and papilledema, the percent of papilledema in GBS was 4.29%.

CSF protein level and pressure was significantly elevated in patients with papilledema comparing to those without. CSF protein level and pressure was elevated with time of disease progression.

No significant difference in the age, gender, limb weakness, sensory involvement, bulbar involvement, respiratory involvement, need for mechanical ventilation and facial palsy among patients presented with or without papilledema. But regarding the patients who had high CSF protein, there is significant association between papilledema and requirement for the mechanical ventilation.

There is more correlation between papilledema and AIDP as compared to (AMAN, AMSAN).

Ethical Clearance- Taken from Iraqi Board for Medical Specialization /Ministry of Higher Education And Scientific Research /Republic of Iraq**.**

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REFERENCES

1. Hauser SL, Amato AA. Guillain-Barré Syndrome and other immune-mediated neuropathies. In: Hauser SL, Josephson SA. (eds.) Harrison‟s Neurology in Clinical Medicine. 4th ed. New York: McGraw-Hill; 2017.p.681-690.
2. Katirji B, Koontz D. Disorders of Peripheral Nerves. In: Daroff RB, Jankovic J, Mazziotta JC, Fenichel GM. (eds.) Bradley‟s Neurology in Clinical Practice. 6th ed. Philadelphia: Elsevier; 2011.p.1957-1958.
3. Dazen MM, Saperstein DS. Acquired immune demyelinating neuropathies. Continuum (Minneap Minn). 2014;20(5):1241–1260.
4. Lunn M, Hanna M, Howard R, Parton M, Rahman S, Reilly M, et al. Nerve and Muscle Disease. In: Clarke C, Howard R, Rossor M, Shorvon S. (eds.) A Queen Square Textbook of Neurology. 2nd ed. Black well: John Wiley & Sons, Ltd; 2016.p.414-416.
5. Baliga RR. (eds.) 250 cases in clinical medicine. 4th ed. Oxford: Elsevier Ltd; 2012.p.711-714.
6. Hayreh SS. Pathogenesis of optic disc edema in raised intracranial pressure. Prog Retin Eye Res. 2016 Jan;50:108-44.
7. Maurice V. Disturbances of Cerebrospinal Fluid, Including Hydrocephalus, Pseudotumor Cerebri, and Low-Pressure Syndromes. In: Ropper AH, Samuels MA, Klein JP.(eds.) Adams and Victor's principles of neurology.10th ed. New York: McGraw-Hill Education; 2014.p.617-638.
8. Kharbanda PS, Prabhakar S, Lal V, Das CP. Visual loss with papilledema in Guillain-Barre syndrome. Neurology India. 2002; 50: 528-529.
9. Colls BM. Guillain-Barr´e syndrome and hyponatraemia. Internal Medicine Journal. 2004;34(4):218.
10. Asbury AK, Cornblath D H. Assessment of current diagnostic criteria for Guillain-Barre syndrome. Ann Neurology J. 2004; 27:21.
11. Donofrio PD. Guillain-Barre´Syndrome. Continuum (Minneap Minn).2017;23(5):1295–1309.

12. Karkare K, Taly AB, Sinha S, Rao S. Temporal profile of pain and other sensory manifestations in Guillain-Barre' syndrome during ten days of hospitalization. Neurology India. 2011;(5):712.
13. .Güngör L, Güngör İ, Öztürk HE, Onar MK. Visual Evoked Potentials in Guillain-Barré Syndrome. J Clin Neurol. 2011;7(1):34-39.
14. Bruce CT, McClelland CM, Van Stavern GP. Papilledema in an otherwise clinically typical case of Miller Fisher syndrome. Can J Ophthalmol. 2015; 50: e67–e69.
15. Ropper AH, Wijdicks EFM, Truax BT. Guillain-Barré Syndrome.
16. Contemporary Neurology Series. 1991; 34:57.
17. .Kalita J, Misra U, Goyal G, Das M. Guillain-Barré syndrome: subtypes and predictors of outcome from India. Journal of the Peripheral Nervous System. 2014; 19:36–43.
18. Gonza´ lez-Sua´ rez I, Sanz-Gallego I, Rodriquez de Rivera FJ, Arpa J. Guillain-Barre´ syndrome: natural history and prognostic factors: a retrospective review of 106 cases. BMC Neurol. 2013; 13:95.
19. Sahin S, Cinar N, Karsidag S. Are cerebrospinal fluid protein levels and plasma neutrophil/ lymphocyte ratio associated with prognosis of Guillain Barré syndrome?. Neurology International. 2017;. 9(2):7032..

Effect of Sensory and Tactile Stimulation to Increase Glasgow Coma Scale (GCS) Score on Stroke Clients Who Have Consciousness Disorders at Abdul Moeloek Hospital, Lampung

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ABSTRACT

The stroke prevalence based on the diagnosis of health workers and the symptoms found in Lampung province was 5.4 ‰. This study aimed to determine the effect of sensory and tactile stimulation on increasing Glasgow Coma Scale (GCS) scores in stroke patients who experience decreased consciousness, using experimental quasy designs. The population in this study were stroke patients with decreased consciousness (GCS < 13), with a sample size of 32 respondents. Each respondent was measured for 5 days. The mean GCS score before intervention in the treatment group was 8.31 and the control group was 11.06. After the intervention, the mean GCS score in the intervention group was 8.94 and the control group was 11.12. While the p-value was 0.006, so it was interpreted that sensory stimulation and tactile stimulation can significantly increase the GCS score. It is recommended that nursing practitioners apply sensory stimulation and tactile stimulation in the management of stroke patients who experience impaired consciousness.

Keywords: *Sensory stimulation, Tactile stimulation, Stroke, GCS score*

INTRODUCTION

Stroke is a functional disorder of the brain due to obstruction of blood flow to the brain caused by blockage (ischemic stroke) or brain hemorrhage (hemorrhagic stroke) which can cause nerve paralysis even to death. According to Basjiruddin (2007), in the USA it is estimated that the incidence of strokes per year in the USA is > 700,000 which causes 160,000 (20%) deaths per year. Stroke is the third leading cause of death in industrialized countries and is a major cause of disability in adults. The incidence of stroke is increasing, because the number of people aged > 65 years has increased from 390 million at present to 800 million by 2025[(1)].

Based on the 2013 Riskesdas data, it is known that there are 12 stroke patients per 1000 population. The prevalence of stroke in Lampung Province based on the diagnosis of health workers is 3.7 ‰ and based on the diagnosis of health workers and symptoms is 5.4 ‰[(2)].

Stroke is the number one killer disease in Indonesia. People aged > 65 years are most at risk for stroke, but 25 % of strokes also occur in people aged < 65 years, including children. People who smoke, lack exercise, and have a poor diet are also prone to stoke. In addition, people with impaired blood circulation due to high blood pressure, high cholesterol, irregular heartbeat or atrial fibrillation, and diabetes, are also prone to stroke[(2)].

The initial attack of ischemic stroke is generally in the form of impaired consciousness, unconsciousness, confusion, headache, difficulty concentrating, disorientation, while hemorrhagic strokes are usually often accompanied by acute headache and decreased consciousness that develops rapidly to coma[(1)].

Nursing or non-pharmacological therapies that can be given to patients with coma are to provide sensory stimulation in the form of visual stimulation, olfactory, tactile, gustatory, auditory and[(3)]. Sensory stimulation as soon as the symptoms of stroke are detected can prevent widespread damage to the brain area[(4)].

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The effects of sensory stimulation, one of which is music therapy can reduce the stimulation of the sympathetic nervous system. The response that arises from the decline in activity is a decrease in adrenaline activity, reduce tension in neuromuscular activity, and increase the threshold of consciousness. Indicators that are commonly measured are decreased heart rate, respiratory rate, stomach acid, and blood pressure[5].

Campbell (2002) states that hospitals in the world that apply music therapy such as Beth Abraham Hospital in the American Bronx, Charing Cross Hospital in London, music therapy are used during the surgical process. Saint Luke's Hospital in Chesterfild uses music therapy in the field of physical rehabilitation, Saint Mary Hospital's respiratory intensive care unit in Green Bay uses music therapy in order to create a healing atmosphere[6].

Besides sensory stimulation, tactile stimulation also has important meaning. According to Scanhanberg, touch has power ten times greater than verbal or emotional contact, and touch affects almost everything a person does. There are no other senses that are more stimulating than touch. Researchers now know that certain types of tactile stimuli on the skin, will send a message to the brain, which in turn stimulates the formation of oxytocin and endorphins. Oxytocin strengthens the bond between mother and baby, while endorphin-peptide is related to opiates which creates a feeling of comfort[7].

In Indonesia, music therapy and tactile stimulation have not been widely applied in Dr. H. Abdul Moeloek hospital also has not applied sensory stimulation and tactile stimulation as one of the alternative therapies in order to cure patients.

MATERIALS AND METHOD

The design of this research was quasi-experimental. The research was conducted on 2 to 31 October 2017 at Dr. H. Abdul Moeloek Hospital, Lampung, Indonesia. The population of this study were impaired ischemic and hemorrhagic stroke patients (GCS < 13) who were treated in the intensive care unit (lCU) and the Bougainvillea Room of Dr. H. Abdul Moeloek Hospotal, Lampung. The sample size of the intervention group and control group were 16, respectively, chosen by accidental sampling technique.

The research intervention instrument was a music player from the VSB - 810 Desktop Bluetooth Speaker using soft volumes without earphones. The data collection instrument about Glasgow Coma Scale (GCS) was an observation sheet. Data collection was carried out using the following procedures: 1) before being given sensory and tactile stimulation, GCS was first measured, 2) music was played to the patient, with a volume that was heard by normal people's ears, for 30 minutes, 3) when the patient listened to music, tactile stimulation was carried out by sweeping tapping technique, that was, the patient's family rubs all of the patient's extremities for 20 minutes, followed by an approximation of pressing all the joints on the extremities for 10 minutes (the family must be trained first, 4) sensory stimulation was performed once a day, morning, afternoon and at night, for 5 days, 5) GCS evaluation was carried out, 6) calculation of the difference in GCS values between pre-intervention and post-intervention in the intervention group and control group. data about awareness level (GCS) is numerical data so it is presented in the form of mean, standard deviation, minimum score and maximum score[8]. The T test with a 95 % confidence interval was used to test the difference in GCS values between the two groups.

FINDINGS

The results of measuring the level of consciousness of patients based on GCS for the intervention group and control group are presented as follows.

Table 1. The level of consciousness of patients based on GCS for the intervention group and control group before the intervention

Group	Mean	SD	Min – Max	95% CI
Intervention group (n = 16)	8.31	2.245	5-13	7.12-9.51
Control group (n = 16)	11.06	2.048	7-13	9.97-12.15

Table 2. The level of consciousness of patients based on GCS for the intervention group and control group after the intervention

Group	Mean	SD	Min – Max	95% CI
Intervention group (n = 16)	8.94	2.048	5-13	7.85-10.03
Control group (n = 16)	11.12	2.125	7-14	9.99-12.26

Table 3. Comparison of changes in GCS mean scores between the intervention group and the control group

Group	Before	After	Changes in mean score	p-value
Intervention group (n = 16)	8.31	8.94	0.63	0.0006
Control group (n = 16)	11.06	11.12	0.60	

Based on the table above it can be interpreted that the intervention group has an increase in the average GCS score that is greater than the control group. The T Test results showed p-value 0.006 so it was concluded that there was a significant difference between the GCS mean score of the intervention group and the GCS mean score of the control group.

DISCUSSION

Based on the results of data analysis, there were significant differences in GCS mean scores between the intervention groups who received music therapy and tactile stimulation, with the control group. The results of this study are in line with the results of Asrin's research that music therapy is useful in increasing the status of consciousness of patients with severe head trauma. In addition, music therapy can also provide a positive stimulus to physical and psychosocial responses[9].

Rosenfeld & Dun (1999) also reported the same thing that music therapy can help patients to restore awareness, communication, some physical abilities, and provide a pleasant experience[10]. Auntari (2001) concluded that auditory stimulation is a beneficial thing to encourage healing of head injury patients from coma and increase the level of patient awareness[11]. The behavioral response of head injury patients with loss of consciousness who are given stimulation of familiar music sounds is greater than patients who are not given music sound stimulation. The above can occur due to the relaxation effect of soft music which is likely to have a positive effect on the brain because of the reticular activating system (RAS) which functions to control alertness or awareness and wake-sleep cycles. For patients with unconscious head trauma, the only function is the RAS and hypothalamus and as a consequence of the healing process, the higher elements of the brain will begin to function[10].

The effect of sensory stimulation including music therapy is to reduce the sympathetic nervous system stimulation. The response that arises from the decline in activity is decreased adrenaline activity, decreased tension in neuromuscular activity, and increased awareness threshold. Indicators commonly measured are decreased heart rate, respiratory rate, decreased gastric acid, and decreased blood pressure[5].

When viewed from the mechanism of the relationship between the nervous system and the endocrine system, music stimulation or sound waves can stimulate the activation of dopamine which physiologically plays a role in increasing one's alertness. This is consistent with other studies at McGill University Montreal that "listening to music can trigger the release of dopamine in the body[12].

In this study, in addition to sensory stimulation patients also received tactile stimulation. According to Scanhanberg, touch is ten times stronger than verbal or emotional contact, and touch also affects almost everything a person does. There are no other senses that are more stimulating than touch. Researchers now know that certain types of tactile stimuli on the skin, will send a message to the brain that stimulates the formation of oxytocin and endorphins. Oxytocin strengthens the bond between mother and baby, while endorphin-peptide which is related to opiates creates a feeling of comfort[7].

Tactile stimulation is performed on the skin, muscles, joints with various techniques, namely tapping, swiping, approximation. Tactile stimulation in principle must cause muscle contraction, so that it will stimulate the golgi tendon and muscle spindle. Impulses derived from muscle spindles and tendon organs are sent by conduction fibers that are the most rich in myelin, namely fiber. Other propiepteptive impulses derived from fascial receptors, deeper joints and connective tissue, travel in less myelin fibers. Knocking, swiping, tapping and approximation will stimulate propioseptors on the skin and joints, the muscle spindle will react by sending the impulse to the anterior motoneuron. Stimulating these neurons causing a brief increase in contraction.

Stimulation of muscle spindles and golgi tendons will be informed through afference to the central nervous system so that they will contribute facilitation and inhibition (gracanin). The tactile stimuli that are repeated will provide information to the "supraspinal mechanism" so that an integrated motion pattern occurs and becomes movements with functional patterns. Tactile stimulation through the peripheral motor nerves exercises "graps" and "release" hand functions and can facilitate muscle weakness in movement.

CONCLUSION

Based on the results of the study it can be concluded that the combination of music therapy and tactile stimulation proved effective to increase consciousness of stroke patients who experience impaired consciousness.

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Ethical Clearance: Yes

REFERENCES

1. Basjiruddin A. The Management of Hypertension to Prevent Stroke [Internet]. Departemen Neurologi, Fakultas Kedokteran Universitas Andalas. 2007 [cited 2017 Feb 7]. Available from: http://neuro.fk.unand.ac.id/in/research/-the-management-of-hypertension- toprevent-stroke
2. Kemenkes RI. Basic Health Research 2013 (Riset Kesehatan Dasar 2013). Jakarta: Balitbangkes Kementerian Kesehatan Republik Indonesia; 2013.
3. Berman A, Kozier B, Erb GL. Kozier and Erb's Fundamentals of Nursing: Concepts, Process and Practice. Melbourne: Pearson Australia; 2018.
4. Hakon J, Quattromani MJ, Sjölund C, Tomasevic G, Carey L, Lee JM, Ruscher K, Wieloch T, Bauer AQ. Multisensory Stimulation Improves Functional Recovery and Resting-state Functional Connectivity in the Mouse Brain after Stroke. Neuroimage Clin. 2017 ; 2 (17) : 717-730.
5. Novita D. The Effect of Music Therapy on Postoperative Pain "Open Reduction Internal Fixation (ORIF)" in RSUD Dr.H Abdul Moeloek Lampung Province (Pengaruh Terapi Musik Terhadap Nyeri Post Operasi Open Reduction Internal Fixation (ORIF) di RSUD Dr.H Abdul Moeloek Provinsi Lampung). Graduate Thesis. Jakarta: Universitas Indonesia; 2012.
6. Campbell D., Effect of Mozart (Efek Mozart). Jakarta: Gramedia Pustaka Utama; 2002.
7. Sylwester R. A Celebration of Neurons: An Educator's Guide to the Human Brain. Alexandria, VA: Association for Supervision and Curriculum Development; 1995.
8. Nugroho HSW. Descriptive Data Analysis for Numerical Data (Analisis Data secara deskriptif untuk Data Kategorik). Ponorogo: Forum Ilmiah Kesehatan (Forikes): 2014.
9. Asrin, Mardiyono, Saryono. Utilization of Music Therapy to Improve Consciousness of Severe Head Trauma Patients (Pemanfaatan Terapi Musik untuk Meningkatkan Status Kesadaran Pasien Trauma Kepala Berat). Jurnal Keperawatan Soedirman (The Soedirman Journal of Nursing). 2007 ; 2 (2) : 102-106.
10. Rosenfeld JV, Dun B. Music Therapy in Children with Severe Traumatic Brain Injury. In: Pratt RR, Grocke DE, editors. Music Medicine 3. Melbourne (Australia): University of Australia; 1999. p. 35–46.
11. Auntari P. The Effect of Familiar Voice to Auditory Stimulation on Level of Conscious and Behavioural Respon of Auditory in Head Injury Pasients with Unconscious. Master Thesis. Thailand: Khon Kaen University; 2001.
12. http://repository.unri.ac.id/accessed on November 3, 2017.

Liver Function and Some Biochemical Parameters affected by Anabolic Androgen Steroids and Diet Supplements Consuming

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ABSTRACT

This study aims to evaluating the possible effect of anabolic androgen steroids (AAS) and diet supplements DS consuming by bodybuilders on their liver function and some biochemical parameters depending on consuming period. Blood samples were collected from 20 men didn't play any sport and 82 sport men who divided to four groups: 20 bodybuilder men consuming AAS, 20 consuming DS, 20 without consuming, and 22 football players. BMI of the subjects were also calculated. BMI and The frequency of overweight were significant higher in bodybuilder consuming AAS compared to other groups. Total and direct serum billirubin was significant higher in football player than bodybuilder consuming AAS and DS. The total bilirubin was also significant higher in football player than non sport men. While Alkaline Phosphate (ALKP) level was significant lower, Aspartate transaminase AST and Alanine transaminase (ALT) level were significant higher in serum of bodybuilder consuming AAS. Furthermore, their levels in bodybuilder consuming diet supplement were significant higher than non sport. No differences in ultra high-density lipoproteins (UHDL) and Cholesterol (Chol) levels were detected while Trig level was significant lower in serum of football player. Triglyceride (Trig) level was also significant lower in the serum of bodybuilder without consuming than consuming AAS. The differences of these parameters were studied in Bodybuilder consuming AAS and diet supplement groups in three consuming period: less 1 year, 1 to 2 years, and more than 2 years. No differences between the two groups after consuming period less than 1yr and 1-2yr while significant higher in bodybuilder consuming AAS after more than 2yr compared to consuming supplement were detected. As conclusion, both AAS and protein supplements have side effects on the liver function and other biochemical parameters and these effects increase with the consuming period especially the effects of AAS.

Keywords: *AST, ALT, AAS, ALKP, billirubin*

INTRODUCTION

The search for ways to increase the speed and quality of physical strength and activity has been a tendency for centuries(1). The use of hormones and protein supplements has become prevalent throughout the world. More disturbing is the fact that multiple studies have reported that a large number of people who consume these improvements did not seek medical advice before taking them(2). Most athletes use more than one product. The widespread use of anabolic steroids (AAS) has been reported by athletes, for purpose of enhance muscle functions and strength in sport.

The side effects of AAS abuse are well established such as its effect on the cardiovascular system(3-5), hepatic function(6, 7), and adrenal and renal function(8, 9). On the other hand, the usage of supplements is more accepted by bodybuilders because of not mentioned some harmful additives, which are included in dietary supplements, on the labels of their packages. Despite the fact that these supplements have many side effects, they are not subject to a serious examination of their effectiveness and public safety(10). Many studies have reported that dietary supplements have many dangers effect such as, cardiovascular disease, blood diseases,

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metabolism, and neurological problems(11) While there is little scientific data confirming the beneficial effects of dietary supplements in athletes(12).

So this study was conducted for the purpose of evaluating the possible effects not only of steroids hormones but also of some commonly used supplements by bodybuilders on their some biochemical and liver function parameters depending on consuming, and then comparison was made with a control group.

MATERIAL AND METHOD

In this study, a total number of 82 sport men were selected from the different gyms in Thi-Qar/Iraq which divided to four groups: 20 bodybuilder men consuming AAS (G1), 20 bodybuilder men consuming diet supplements (G2), 20 bodybuilder men without any drug consuming (G3), and 22 foot ball players (G4); and 20 men didn't play any sport (G5) with apparently healthy status were included. The age group was in the range of 18- 40 years.

After one day from ASS and DS consuming, the consent was taken and 5 ml of venous blood was collected from antecubital vein with all proper aseptic precautions and by disposable syringe in a dry sterile test tube. The blood samples were centrifuged for 5 min. at 5000 rpm. The serum samples were used to estimate the biochemical and liver function parameters by Architect plus/Abbott c4000/ Germany using kits from Abbott.

The body weights of individuals were measured by body balance and the body heights of them were measured by paper tape. BMI was calculated as weight in kilograms divided by height in meters squared(13). The BMI of individuals was classified according WHO classification to underweight, Normal weight, overweight, and obese (<18.5, 18.5-24.9, 25.0-29.9, and >30 kg/m2 respectively).

Results are expressed as mean ± standard error (M±SE) or ± standard deviation (M±SD) and as frequency of observations percentage (Cases %). Data were analyzed by one-way analysis of variance (ANOVA) followed by Fisher's test for multiple comparisons, using Statview version 5.0. Differences were considered significant when $p<0.05$.

RESULTS

The (M±SD) of age was significant lower in the football player (G4) (22.3±0.9) than other groups (27.4±1.4 in G1, 27.9±1.3 in G2, 29.7±1.8 in G3, and 26.1±1.4 in G59. The (M±SE) of BMI was significant higher in the bodybuilder consuming AAS (G1) (27±0.4) compared to other groups (24.9±0.4 in G2, 24.2±0.3 in G3, 23.4±0.2 in G4 and 22.8±0.3 in G5). The frequency of overweight was also significant higher in the bodybuilder consuming AAS (G1) (82%) and in DS (G2) (45%) compared to others (20% in G3, 10% in G4 and G5).

Total and direct serum billirubin was significant higher in football player than bodybuilder consuming AAS and consuming DS. The total bilirubin was also significant higher in football player than non sport men (Figure-1)

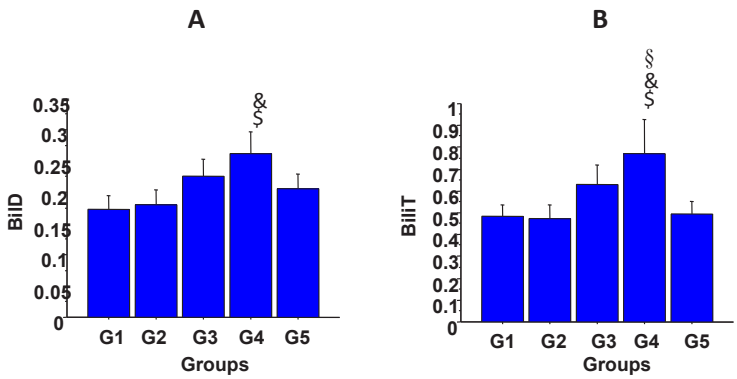

Figure-1: Direct (A) and Total (B) bilirubin levels in serum of bodybuilder consuming AAS (G1), consuming DS (G2), without consuming and supplement (G3), football player (G4), and non sport (G5). $ Significant difference vs G1, & significant difference vs G2, and § Significant difference vs G5

GOT or AST and GPT or ALT levels were significant higher in serum of bodybuilder consuming AAS compared to non sport, football player, and bodybuilder without consuming. Furthermore, AST level in bodybuilder consuming DS was significant higher than non sport. (Figure-2A&B)

ALKP level was significant lower in serum of bodybuilder consuming DS compared to non sport, football player, and bodybuilder without consuming (Figure-2C)

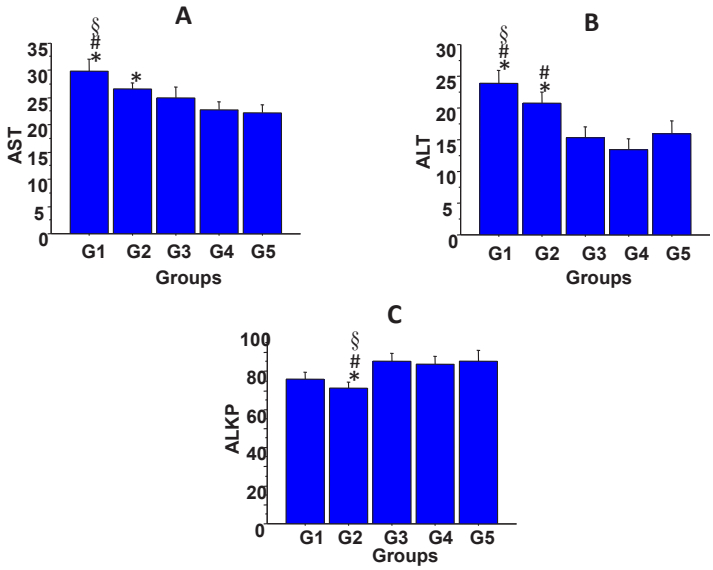

Figure-2: AST (A), ALT (B), and ALKP (C) levels in serum of bodybuilder consuming AAS (G1), consuming DS (G2), without consuming and supplement (G3), football player (G4), and non sport (G5). * Significant difference vs G5, # significant difference vs G4, and § Significant difference vs G3.

No differences in UHDL and Chol levels were detected while Trig level was significant lower in serum of football player compared to consuming AAS, and DS. Trig level was also significant lower in the serum of bodybuilder without consuming than consuming AAS. (Figure-3)

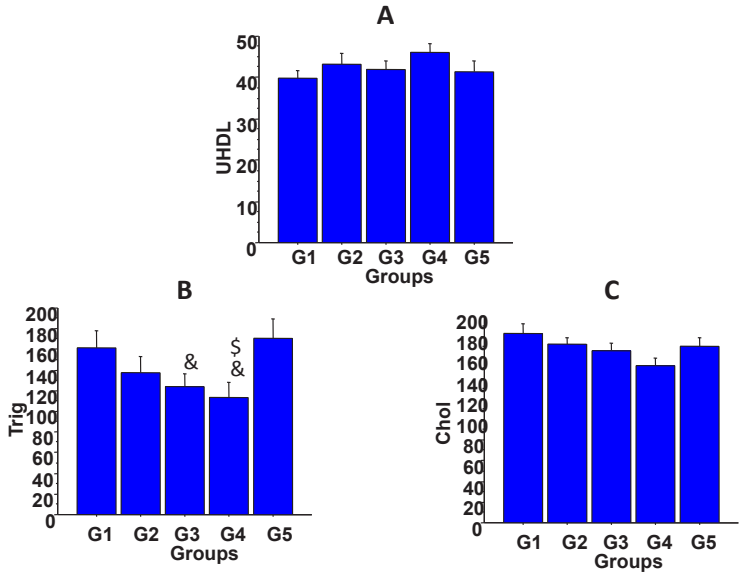

Figure-3: UHDL (A), Trig (B), and Chol (C) levels in serum of bodybuilder consuming AAS (G1), consuming DS (G2), without consuming and supplement (G3), football player (G4), and non sport (G5). $ Significant difference vs G1, and & significant difference vs G2.

No differences in the Direct and total bilirobin levels between the two groups after consuming period less than 1yr and 1-2yr were detected while significant higher direct and total bilirobin levels in bodybuilder consuming AAS compared to DS after more than 2yr consuming period (Figure-4)

In bodybuilder consuming AAS, AST level was significant higher after consuming period 1-2yr while ALT and ALKP levels were significant higher after more than 2yr compared to consuming DS (Figure-5).

No differences in the UHDL, trig, and chol levels between the two groups after consuming period less than 1yr and 1-2yr were detected while after more than 2yr they were significant higher in bodybuilder consuming AAS compared to consuming DS (Figure-6)

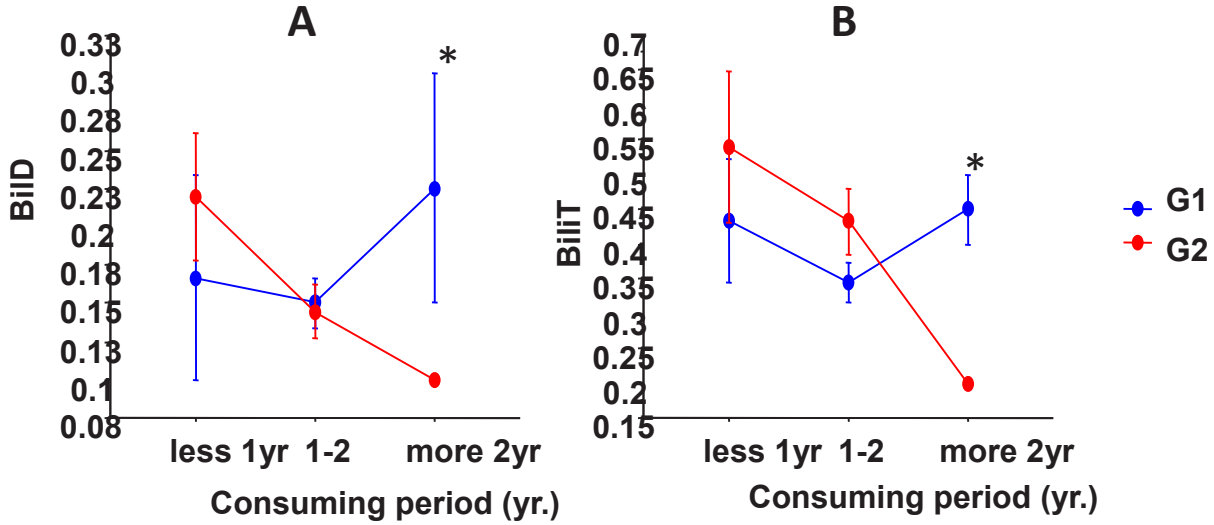

Figure-4: direct bilirobin (A), Total bilirobin (B) levels in serum of bodybuilder consuming AAS (G1) and consuming DS (G2) after difference consuming periods. * Significant difference G1 vs G2.

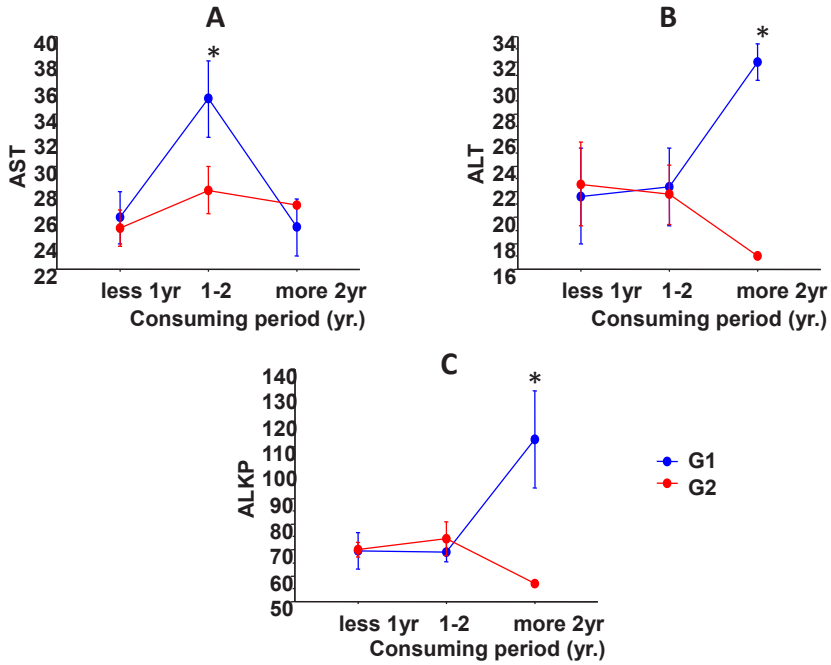

Figure-5: AST (A), ALT (B) and ALKP (C) levels in serum of bodybuilder consuming AAS (G1) and consuming DS (G2) after difference consuming periods. * Significant difference G1 vs G2.

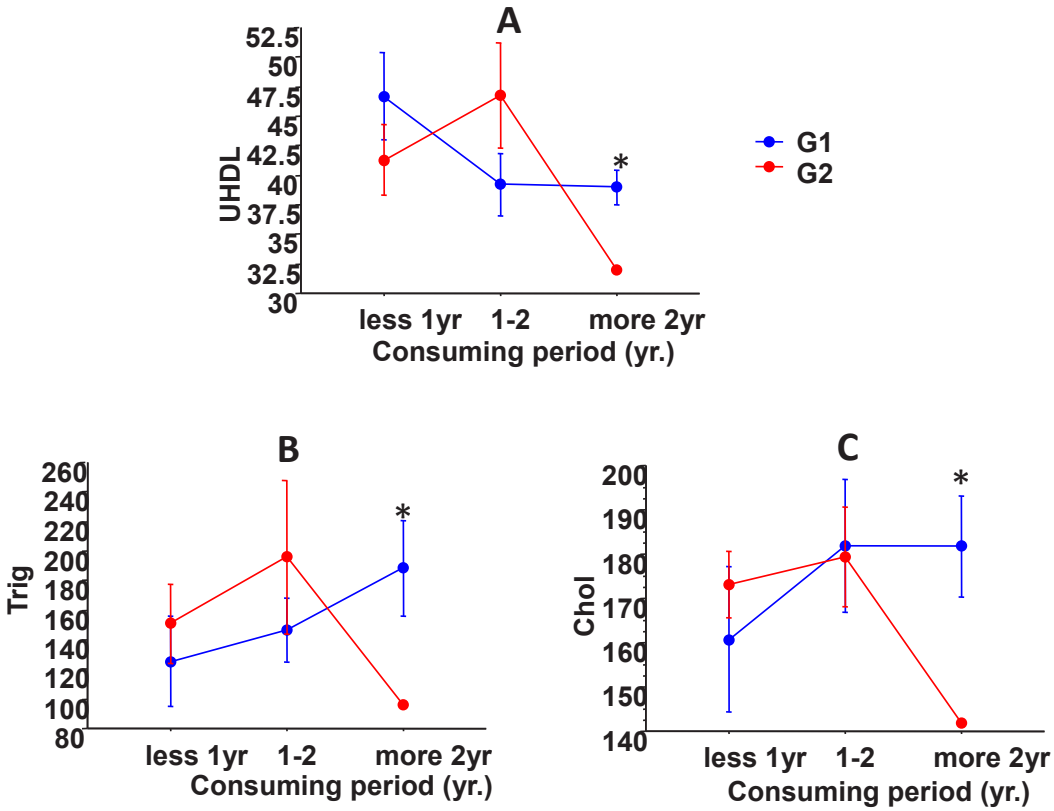

Figure-6: UHDL (A), Trig (B) and Chol (C) levels in serum of bodybuilder consuming AAS (G1) and consuming DS (G2) after difference consuming periods. * Significant difference G1 vs G2.

Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: Taken from Biology Department/ Science College/ Mustasiriyah University which have a deal with Health Ministry

DISCUSSION

Many athletes used Anabolic because of its effect on protein synthesis and muscle growth(14-16) which lead to increase muscle size and reduce body fat. AASs produce anabolic effects by binding to receptors of steroid. They activate the receptor of androgen which controlled the targeted gene transcription and lead to regulate the accumulation of DNA needed for growth of muscle. Since amino acids are effectively used for synthesis of proteins, The muscular strength and mass are increase when AAS bind with the androgen receptor of skeletal muscle(14, 17). It also reduces the glycocorticoid-based metabolism by linking competitively to glucocorticoid receptors(18). These evidences can explain the increase of BMI and the frequency of overweight in bodybuilder group which consumed AAS Bodybuilders. On the other hand, the bodybuilder may complement their protein diet for convenience, lower cost (relative to meat and fish products), ease of preparation, to avoid the simultaneous consumption of carbohydrates and fats, and to support maximum muscle growth(19, 20); but Anders et al reported there was no significant effect on BMI by consuming diet supplement(21). Our results show that the BMI didn't affected by diet supplement but the frequency of overweight was higher also in the bodybuilder consuming diet supplement.

The hepatotoxicity occurrence of drug is a major problem in all stages of clinical development of drug and the main cause of post marketing warnings and withdrawals(22). The liver function tests asymptomatically elevated during clinical trials resulting by drug-related and many other factors, such as strenuous exercise which may increase the levels of blood transaminase(23) but there was no information about the effect of body build on liver function tests(24, 25). In this study, it has been shown that consuming of AAS and diet supplement resulted in profound increases in the liver function parameters, AST and ALT but not ALKP levels.

AAS has many toxic and hormonal effects which were documented, attention has recently been shifted to increased levels of cholesterol and LDL and decrease levels of HDL(26, 27) Some studies have showed that repeated doses of AAS are correlated with an increase in cholesterol levels, while others have failed to show such correlation(28). Some studies have reported that the high exercise increase the liver lipoprotein lipase, which in turn leads to improved TG clearance and may reduce the plasma clearance of HDL components(29). The significant variation in the effect of ASS on cholesterol and triglyceride may be due to different study designs used, sampling time, AAS type, management path, and etc(30, 31). our study has showed that the levels of cholesterol, UDHL, and triglyceride did not effected in the bodybuilder consuming AAS or diet supplement but triglyceride decreased in bodybuilder without consuming any drug and in football player.

In this study, all these parameters levels were higher after 2 years from AAS consuming compared to diet supplement. So we can concluded that both AAS and diet supplements have side effects on the liver function and other biochemical parameters and these effects increase with the consuming period especially the effects of AAS.

REFERENCES

1. Sepehri G, Mousavi Fard M, Sepehri E. Frequency of Anabolic Steroids Abuse in Bodybuilder Athletes in Kerman CitydaggerThis article has been published in the Journal of Rafsanjan University of Medical Sciences in Persian language. Addict Health. 2009 Summer;1(1):25-9.
2. Alshammari SA, AlShowair MA, AlRuhaim A. Use of hormones and nutritional supplements among gyms' attendees in Riyadh. J Family Community Med. 2017 Jan-Apr;24(1):6-12.
3. Achar S, Rostamian A, Narayan SM. Cardiac and metabolic effects of anabolic-androgenic steroid abuse on lipids, blood pressure, left ventricular dimensions, and rhythm. Am J Cardiol. [Review]. 2010 Sep 15;106(6):893-901.
4. Lau DH, Stiles MK, John B, Shashidhar, Young GD, Sanders P. Atrial fibrillation and anabolic steroid abuse. Int J Cardiol. [Case Reports Letter Research Support, Non-U.S. Gov't]. 2007 Apr 25;117(2):e86-7.
5. Maior AS, Carvalho AR, Marques-Neto SR, Menezes P, Soares PP, Nascimento JH. Cardiac autonomic dysfunction in anabolic steroid users. Scand J Med Sci Sports. 2013 Oct;23(5):548-55.
6. Neri M, Bello S, Bonsignore A, Cantatore S, Riezzo I, Turillazzi E, et al. Anabolic androgenic steroids abuse and liver toxicity. Mini Rev Med Chem. [Review]. 2011 May;11(5):430-7.
7. Awai HI, Yu EL, Ellis LS, Schwimmer JB. Liver toxicity of anabolic androgenic steroid use in an adolescent with nonalcoholic fatty liver disease. J Pediatr Gastroenterol Nutr. [Case Reports Research Support, N.I.H., Extramural]. 2014 Sep;59(3):e32-3.
8. Pendergraft WF, 3rd, Herlitz LC, Thornley-Brown D, Rosner M, Niles JL. Nephrotoxic effects of common and emerging drugs of abuse. Clin J Am Soc Nephrol. [Research Support, N.I.H., Extramural Review]. 2014 Nov 7;9(11):1996-2005.
9. Modlinski R, Fields KB. The effect of anabolic steroids on the gastrointestinal system, kidneys, and adrenal glands. Curr Sports Med Rep. [Review]. 2006 Apr;5(2):104-9.
10. McCann MA. Dietary supplement labeling: cognitive biases, market manipulation & consumer choice. Am J Law Med. 2005;31(2-3):215-68.
11. Palmer ME, Haller C, McKinney PE, Klein-Schwartz W, Tschirgi A, Smolinske SC, et al. Adverse events associated with dietary supplements: an observational study. Lancet. [Research Support, U.S. Gov't, P.H.S. Review]. 2003 Jan 11;361(9352):101-6.
12. Geyer H, Parr MK, Mareck U, Reinhart U, Schrader Y, Schanzer W. Analysis of non-hormonal nutritional supplements for anabolic-androgenic steroids - results of an international study. Int J Sports Med. [Clinical Trial Research Support, Non-U.S. Gov't]. 2004 Feb;25(2):124-9.
13. WHO. Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. Report of a WHO Expert Consultation. . Geneva: World Health Organization2004.
14. Lombardo JA. Anabolic-androgenic steroids. NIDA Res Monogr. [Review]. 1990;102:60-73.
15. Giorgi A, Weatherby RP, Murphy PW. Muscular

strength, body composition and health responses to the use of testosterone enanthate: a double blind study. J Sci Med Sport. [Clinical Trial Randomized Controlled Trial Research Support, Non-U.S. Gov't]. 1999 Dec;2(4):341-55.

16. Schroeder ET, Vallejo AF, Zheng L, Stewart Y, Flores C, Nakao S, et al. Six-week improvements in muscle mass and strength during androgen therapy in older men. J Gerontol A Biol Sci Med Sci. [Randomized Controlled Trial Research Support, N.I.H., Extramural Research Support, Non-U.S. Gov't]. 2005 Dec;60(12):1586-92.
17. Mooradian AD, Morley JE, Korenman SG. Biological actions of androgens. Endocr Rev. [Review]. 1987 Feb;8(1):1-28.
18. Zhao J, Bauman WA, Huang R, Caplan AJ, Cardozo C. Oxandrolone blocks glucocorticoid signaling in an androgen receptor-dependent manner. Steroids. [Research Support, N.I.H., Extramural Research Support, U.S. Gov't, Non-P.H.S. Research Support, U.S. Gov't, P.H.S.]. 2004 May;69(5):357-66.
19. Van Duyn MA, Pivonka E. Overview of the health benefits of fruit and vegetable consumption for the dietetics professional: selected literature. J Am Diet Assoc. [Review]. 2000 Dec;100(12):1511-21.
20. Perez CE. Fruit and vegetable consumption. Health Rep. [Comparative Study]. 2002;13(3):23-31.
21. Anders S, Schroeter C. The impact of nutritional supplement intake on diet behavior and obesity outcomes. PLoS One. 2017;12(10):e0185258.
22. Kaplowitz N. Idiosyncratic drug hepatotoxicity. Nat Rev Drug Discov. [Review]. 2005 Jun;4(6):489-99.
23. Malinoski FJ. Strenuous exercise simulating hepatic injury during vaccine trials. Vaccine. [Case Reports Clinical Trial]. 1992;10(1):39-42.
24. Smith JE, Garbutt G, Lopes P, Tunstall Pedoe D. Effects of prolonged strenuous exercise (marathon running) on biochemical and haematological markers used in the investigation of patients in the emergency department. Br J Sports Med. [Research Support, Non-U.S. Gov't]. 2004 Jun;38(3):292-4.
25. Pettersson J, Hindorf U, Persson P, Bengtsson T, Malmqvist U, Werkstrom V, et al. Muscular exercise can cause highly pathological liver function tests in healthy men. Br J Clin Pharmacol. [Comparative Study]. 2008 Feb;65(2):253-9.
26. Hartgens F, Kuipers H. Effects of androgenic-anabolic steroids in athletes. Sports Med. [Research Support, Non-U.S. Gov't Review]. 2004;34(8):513-54.
27. Urhausen A, Torsten A, Wilfried K. Reversibility of the effects on blood cells, lipids, liver function and hormones in former anabolic-androgenic steroid abusers. J Steroid Biochem Mol Biol. [Research Support, Non-U.S. Gov't]. 2003 Feb;84(2-3):369-75.
28. Hartgens F, Rietjens G, Keizer HA, Kuipers H, Wolffenbuttel BH. Effects of androgenic-anabolic steroids on apolipoproteins and lipoprotein (a). Br J Sports Med. [Clinical Trial Randomized Controlled Trial]. 2004 Jun;38(3):253-9.
29. Katsanos CS, Grandjean PW, Moffatt RJ. Effects of low and moderate exercise intensity on postprandial lipemia and postheparin plasma lipoprotein lipase activity in physically active men. J Appl Physiol (1985). [Clinical Trial Research Support, Non-U.S. Gov't]. 2004 Jan;96(1):181-8.
30. Garevik N, Skogastierna C, Rane A, Ekstrom L. Single dose testosterone increases total cholesterol levels and induces the expression of HMG CoA reductase. Subst Abuse Treat Prev Policy. [Research Support, Non-U.S. Gov't]. 2012 Mar 20;7:12.
31. Samieinasab MR, Shahraki MR, Samieinasab F, Najafi S. Influence of nandrolone decanoate administration on serum lipids and liver enzymes in rats. ARYA Atheroscler. 2015 Jul;11(4):256-60.

Spatial Variation of Human Cancer Incidence across Babylon State in (2010)

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ABSTRACT

Cancer is an abnormal growth of the cells of the body, and may move from one place to another and lead to the growth and proliferation of irregular cells to form tumors are on the two types of tumor and benign tumor malignant, and there is no specific reason for the emergence of tumors and factors Environmental, genetic, economic, social, dietary habits such as smoking, drinking alcohol and drugs. The research aims to study cancer in the province of Babylon, one of the Iraqi provinces, the results showed a clear spatial disparity between the administrative units of the province, the rate of cases of cancer in all the province of Babylon in 2010 (43) Of the population, which is more than the rate of cases of infection across Iraq, amounting to (38) injuries per 100 thousand people. The study also showed a difference in the rates of infection according to the ten common types of cancer in Babil province comes on the list of these types is breast cancer, where the rate of infection (9.35) per 100000 population, which is one of the most dangerous types of cancer threat to the population, especially females. Lung cancer and bronchitis come in second place with a rate of (8.45) infections per 100000 population. Then leukemia comes in third place (5.47) per 100000 population. Pancreatic, gastric, and laryngeal cancers are among the lowest-risk cancers for the above-mentioned species (1.97-1.86-1.69), respectively. The level of administrative units, Hala recorded the highest rate of cases infected with the disease (56.18) per 100000 population. Followed by Musayyib (43.51), Mahawil (31.89), and Al-Hashimiah (27. 80).

***Keywords**: Cancer, Genetics, Environment, Spatial Variation*

INTRODUCTION

Cancer is the most important cause of mortality in the world. Breast cancer is the second most common cause of cancer death in women. Many cancers initially respond to chemotherapy, but later develop resistance (1). Represents most cancers some of the essential challenges cutting-edge then after challenges dealing with researchers every over the world, health institutions, partial or global into typical and the Iraqi presidency among particular, along with the increasing fall of annual disease. Given the respect regarding this topic has gone according to the middle on the discipline of most cancers of the kingdom about Babylon and in accordance with articulate the trade about its spatial decoding is a primary purpose of the country (2). It is that willpower concerning the spatial certain about the provinces concerning the Middle Euphrates, as into the chart (3). Located among latitudes (32° -15 33°) north or longitudes (44°- 15 45°) in imitation of the past about the figure (1) yet a bourgeois (5119 km2) region consists of the education 16-node administration at the level concerning the arm the centers consume the 12 of hand (4).

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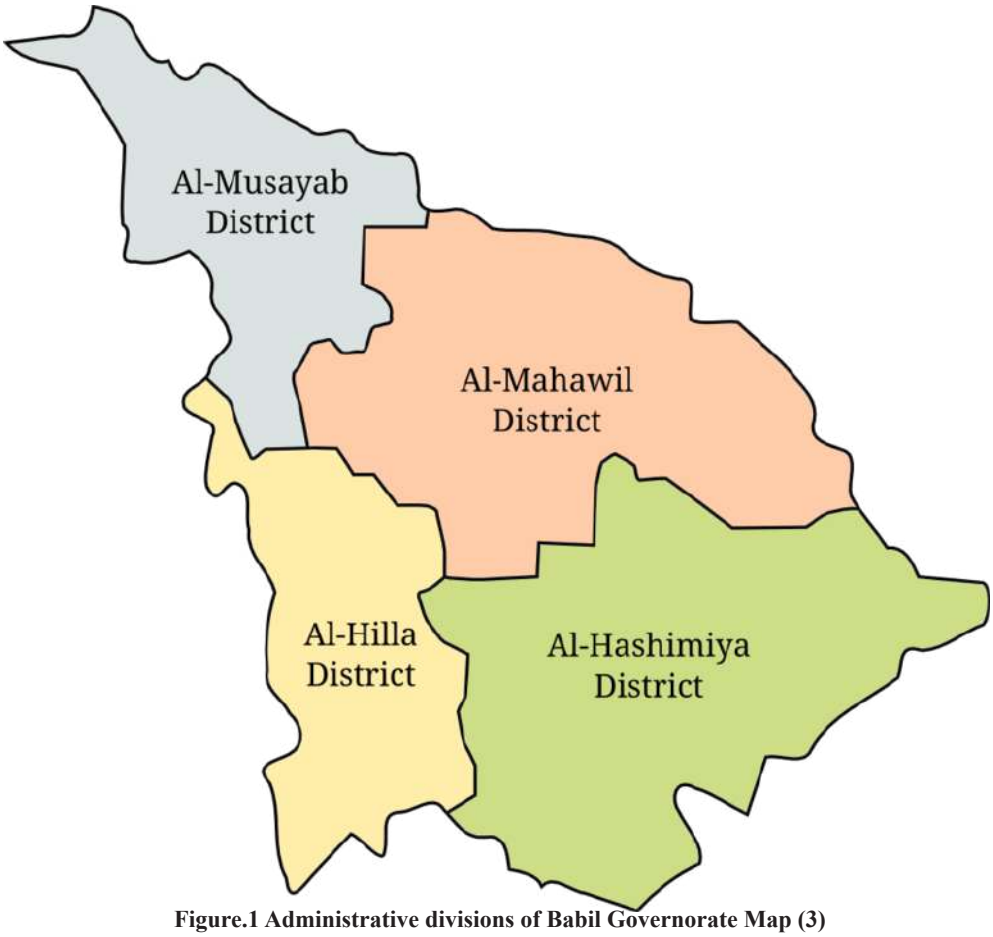

Figure.1 Administrative divisions of Babil Governorate Map (3)

Cancer can be defined as a disease in which a group of abnormal cells grow uncontrollably by disregarding the normal rules of cell division. Normal cells are constantly subject to signals that dictate whether the cell should divide differentiate into another cell or die (5). Cancer cells develop a degree of autonomy to continue and spread it can be fat. In fact, almost 90% of cancer-related deaths are due to tumor spreading –a process called metastasis. Now define cancers a disease that involves change or mutations in the cell genome .these change (DNA mutations) produce proteins that disrupt the delicate cellular balance between cell division and quiescence, resulting in cells that keep dividing to form cancers one. The second – largest common disease cause the death in the world is cancer – malignant tumors (6).

Other causes in the increase of cancer diseases in the Musayyib district is the missile strikes by the occupation forces in the first Gulf War and the second addition to the large number of former military manufacturing sites and their remnants and the rest of them currently in the region as a source of danger and impact on human health due to the nature of materials used in the manufacture of weapons and ammunition (7), and the non-compliance of these institutions with the rules of health safety of former employees and neglect of the health authorities of these sites and now isolate them from the population and prevent them from approaching (26), which caused a significant increase in the number of cases of cancer. Mahaweel is ranked third in the number of casualties (31.89) per 100000 inhabitants (8), The lowest rate of infection (27, 80) per 100000 inhabitants was recorded in Al Hashimi district because the two cases are characterized by the agricultural nature of the arable land and the economy in general on agriculture, which means the reduction of the proportion of manufacturing and the resulting environmental pollutants compared to what is in the areas of Hala and Musayyib (9).

MATERIAL AND METHOD

Spatial variation of cancer at the level of Babil province

The degree of cancer is different not only globally

but also at the level Regional and local levels where the factors of the geographical environment share the variation in infection at previous levels. Data from Table 1. shown the calculated rate of infection per 100000 population. There is a difference in the incidence of cancer at the level of the administrative units of Babil state in 2010, (56, 18) per 100000 population (9). This is due to the large size of the judiciary as well as the fact that the city's environment has high levels of pollution. The industrial district, which includes most of the establishment's industries such as construction industries, a chemical, textile, and soft drinks (10). In addition, factories produce hundreds of tons of solid waste, as well as large amounts of polluting gases such as CO2, H2SO4, and CO. (cadmium, cobalt, chromium, lead, manganese, nickel, sulfide). Some studies conducted in the al-Hela river indicate that cadmium ranged from 1.9-2.58 µg/g this amount is close to the high global concentrations (11).

Table. 1 Geographical distribution of the rate of cases of cancer in Babil province in 2010

Administrative unit	Infection rate per 100000 population
Spend the solution	56‹18
Mahaweel district	31‹89
Hashemite district	27‹80
Musayyib district	43‹51
Total Governorate	43‹00

Role of genetic

Many studies have been conducted to determine changes in gene expression of DNA polymerases in human cancer (12).

Role of environment

The development of cancer in a species is influenced by a wide variety of changes in the internal and external environments of the host. The aspects of the internal environment that have been studied most thoroughly are hormonal status and nutrition. Hormonal imbalance in mice leads to the appearance of at least five types of tumors in tissues especially dependent on hormonal secretions in their physiology. Hormonal and nutritional also are associated with some tumors in humans. Iodine deficiency may be a factor in the genesis of thyroid cancer. Deficiency development of pharyngeal cancer (13).

Spread of cancer

One of the biggest problems with cancer is its spread in different parts of the body. This spread through any or all of the three following routes. Any other disease, in cancer also, both the environmental as well as the genetic factors, played in the causation of the disease. Over the last few decades, it has been found the environment plays a prominent role in the causation of most cancer 80 to 90 per cent of all cancers are said to be dependent directly or indirectly on environmental factors (14).

Chemical and physical carcinogens

Induced neoplasms are tumors that can be evoked at will in human exposed to chemical and physical substances. Some of the environmental agents that have been related to cancer in humans are listed in table (2)

Table 2 Environmental agents related to cancer in man

Site	Agent
Liver	Aflatoxin
Marrow	Alkylating agents
Urinary bladder	Aromatic amines
Skin, lung	Arsenic
Lung , serosa	Asbestos
Marrow	Benzene
Urinary bladder	Benzidine
Lung	Chloromethyl ether
Lung	Chromium
Uterus ,Vagina	Estrogens
Lymphatic	Immunosuppressants
Nasal sinus	Isopropyl oil
Lung	Mustard gas
Skin	Radiation, ultraviolet
Lymphatic	Viruses

Some factors can also cause cancer, changes in life – style including drinking alcohol, smoking and working under the sun and the sun itself cause the cancer (15).

RESULT AND DISCUSSION

The results of laboratory tests of water from the Hilla textile factory and soft drinks showed an increase in the values of (Cl So4-T.D.S.T.H) and high concentrations of phosphates, all of which are outside the permissible limit of 4.1 milligrams per liter in the al-Hala water due to industrial waste and wastewater. The existence of large agricultural areas on both sides of the river, which use many types of fertilizers containing phosphate compounds, and contains the elimination of gas station to generate electricity.

Treatment of cancer

Newer approaches in cancer treatment:

1. Gene therapy.
2. Cancer immunotherapy.
3. Focused ultrasound.
4. RNA inhibition.
5. Charged particle therapy.
6. Robotic surgery.
7. Nanotechnology

Spatial variation of cancer cases in Babil province

Table (3) shows the increase in the number of people suffering from cancer diseases in Babil governorate. The number of infected cases in 2003 was 449 cases and the number increased to 1045 in 2005, an increase of 596 cases. The number has been increasing at a high rate of (1162) cases in 2011, an increase of (713) cases compared to 2003, which is about double the number.

Table. 3 Number of cases of cancer diseases in Babil state in the years (2003-2011)

Years	Number of injured
2003	449
2004	775
2005	1045
2006	1064
2007	922
2008	1007
2009	1098
2010	1095
2011	1162

Comparison of infection rates in the province with the total rates of infection in Iraq, we find that the rate of cancer calculated for each (100000 population) of the population in general babil province for 2010 adjusted to (43) injuries per (100000 population) of the population and more than the rate of infection of all of Iraq, (100000 population) of the total population of Iraq. The rates of infection vary according to the ten common types of cancer in the province of Babylon, as shown in Table (4) and that breast cancer is at the top of the list of cancer in the study area where the rate of infection (9.35) injuries per (100000 population). Breast cancer is one of the most common cancers in the world, and its causes are genetic factors. Some studies suggest that breast cancer patients may have a previous history of the sease in this family. On the other hand, Fat, grease, dairy products, and cancer.

The incidence of lung cancer and airway in the second place with an injury rate of (8.45) per 100000 population of the population. This is due to the rise of urban, where the majority of the population in the cities of the center of the province and the rest of the districts and districts do not move far from the center of the province and take a lot, it was observed that air pollution, especially with car exhaust, is especially important after ascertaining the presence of carbon atoms in patients' ulcer during cellular microscopy. Smoking also causes cancer tumors and increases their complications. The performer to death. Leukemia was the third most common type of cancer (5.47). While the lowest incidence was pancreatic, stomach, and laryngeal (1.97-1.86 – 1.69) per 100000 population of each population, respectively.

Table. 4 The commonest ten cancers in Babil number of new cases primary site, percentage of total / 100000 population

primary site	No .of cases	Registered cases /10^5 pop
Preast	166	9.35
Pronchus& lung	150	8.45
Leukemia	97	5.47
Bladder	79	4.45
Non- Hodgkin lymphoma	61	3.44
Brain & other CNS	60	3.38
Colorectal	52	2.93

***Cont.*. Table. 4**

Pancreas	35	1.97
Stomach	33	1.86
Larynx	30	1.69
Total ten	763	43.00

CONCLUSION

Normal cells are constantly subject to signals that dictate whether the cell should divide differentiate into another cell or die. Cancer cells develop a degree of autonomy to continue and spread it can be fat. In fact, almost 90% of cancer- related deaths are due to tumor spreading –a process called metastasis. The research aims to study cancer in the province of Babylon, one of the Iraqi provinces, the results showed a clear spatial disparity between the administrative units of the province, the rate of cases of cancer in all the province of Babylon in 2010. The level of administrative units, Hala recorded the highest rate of cases infected with the disease. Followed by Musayyib, Mahawil, and Al-Hashimiah. Cancer- related deaths are due to tumor spreading –a process called metastasis. Now define cancers a disease that involves change or mutations in the cell genome. These change (DNA mutations) produce proteins that disrupt the delicate cellular balance between cell division and quiescence, resulting in cells that keep dividing to form cancers one.

Ethical Clearance: People identified as potential research participants because of their status as relatives or carers of patient's research participants by virtue of their professional role in the university and departments.

Source of Funding: Self-Funding

Conflict of Interests: The authors declare there is no conflict interests

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REFERENCES

1. Cancer Genome Atlas Network. Comprehensive molecular characterization of human colon and rectal cancer, 2012 Jul, vol.18, no. 487, pp. 330-7
2. Medicine AA of P - The Measurement, Reporting, and Management of Radiation Dose in CT. American Association of Physicists in Medicine. 2008, vol. 4, no 96, pp. 1-34
3. Zanotti J. Turkey: Background and U.S. Relations. Curr Polit Econ Middle East. 2015. Vol. 6, No.1, pp. 1-9
4. Ninković M, Weissenbacher A, Pratschke J, Schneeberger S. Assessing the outcome of hand and forearm allotransplantation using the action research arm test. Am J Phys Med Rehabil. 2015 Mar, vol. 94, no. 3, pp. 211-21.
5. Lanier LL. Up on the tightrope: Natural killer cell activation and inhibition. Nature Immunology. 2008 May, vol. 9, no. 5, pp. 495-502.
6. Elgass K, Pakay J, Ryan MT, Palmer CS. Recent advances into the understanding of mitochondrial fission. Biochim Biophys Acta - Mol Cell Res.

2013. vol. 1833, no 1, pp. 150-161

7. A. H. Jabbar, M. Q. Hamzah, S. O. Mezan, N. N. Hasan, and M. A. Agam, "A Continuous Process for the Preparation, Characterization and Study Thermal Properties of Nickel Oxide Nanostructure," Int. J. Sci. Eng. Res. 2018, vol. 9, no. 3, pp. 590–602.
8. Guo H, Zhu P, Yan L, Li R, Hu B, Lian Y, et al. The DNA methylation landscape of human early embryos. Nature, July 2014, vol. 11, no. 711, pp. 606-610
9. M. Q. Hamzah, Abdullah Hasan Jabbar, Salim Oudah Mezan, "Synthesis and Characterization of Cu2ZnSnS4 (CZTS) Thin Film by Chemical Bath Deposition (CBD) for Solar Cell Applications", International Journal of Scientific Engineering and Research (IJSER), December 2017, vol. 5, no. 12, pp. 35 – 37
10. N. Dorival-Garcia, A. Zafra-Gomez, A. Navalon, J.L. Vilchez, Analysis of bisphenol A and its chlorinated derivatives in sewage sludge samples. Comparison of the efficiency of three extraction techniques, J. Chromatogr. 2012, vol. 12, no. 53, pp. 1-10.
11. A. S. B. A. and M. A. A. Abdullah Hasan Jabbar, Maytham Qabel Hamzah, Salim Oudah Mezan, "Green Synthesis of Silver / Polystyrene Nano Composite (Ag / PS NCs) via Plant Extracts Beginning a New Era in Drug Delivery," Indian J. Sci. Technol. June 2018, vol. 11, no. 22, pp. 1–9.
12. Alexandrov, L. B., Nik-Zainal, S., Wedge, D. C., Aparicio, S. A. J. R., Behjati, S., Biankin, A. V. Stratton, M. R. (2013). Signatures of mutational processes in human cancer. Nature, 2013, vol. 500, no. 7463, pp. 415—421.
13. Cancer Genom Atlas. Comprehensive molecular characterization of human colon and rectal cancer. Nature. 2012 Jul 18, vol. 487, no. 7407, pp. 330-7.
14. M. Q. Hamzah, A. H. Jabbar, S. O. Mezan, N. N. Hasan, and M. A. Agam, "ENERGY GAP INVESTIGATION AND CHARACTERIZATION OF KESTERITE CU 2 ZNSNS 4 THIN FILM FOR SOLAR CELL" Int. J. Tech. Res. Appl, vol. 6, no. 1,2018 pp. 3–6.
15. Lin Y-L, Pasero P. Interference Between DNA Replication and Transcription as a Cause of Genomic Instability. Curr Genomics. 2012 Mar, vol. 13, no. 1, pp.65-73.

Relationship between Self-Concept with Women's Premenopause Anxiety in Facing the Menopause, in Pamekasan, East Java

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ABSTRACT

Introduction: Menopause is a natural thing that happens to every woman, Some people think that menopause is a pleasant thing and some think that menopause is sadness because of losing productive time, often women face menopause with anxiety and anxiety because menopause is identical to aging, mostly women enter the premenopausal period three to five years earlier than actual menopause. This study aims to determine the correlation concept of self with women's anxiety in the face of menopause.

Method: The study design used analytic observational with a partial cross-sectional approach, the independent variables in this study were self-concept and dependent anxiety, with a population of 70 respondents. The sample was 60 respondents using Probability Sampling simple random sampling technique using questionnaires. To obtain the significance level of the relationship, chi-square (x^2) statistical test was performed with $\alpha = 0.05$.

Results: The results showed that most respondents had a positive self-concept, that most respondents have experienced mild anxiety, there is a relationship of self-concept with women's fear in the face of menopause in Sampang Village, Sampang District, Madura Regency.

Discussion: The results of this study are expected to add insight and knowledge for respondents especially regarding self-concept and anticipate the occurrence of anxiety in the face of menopause so that they are ready to face the age of menopause.

Keywords: *Anxiety, Self Concept, Menopause*

INTRODUCTION

Menopause is naturally happen to every woman, Some people think that menopause is a pleasant thing and sadness because of losing productive time. Women often face menopause with anxiety because of identical to aging(1) . The term menopause means the period of menstruation stops. This period is the normal stage of life where every woman will pass between the ages of 40 and 60, the average menopause starts at the age of 52. Most women enter the perimenopause period three to five years earlier and the real menopause (Life challenge.s.2007). The stages of development are one psychological stressor. For example, adolescence, adulthood, advanced menopause that naturally will be experienced by everyone. And if these stages of development cannot be exceeded properly (unable to adapt) there will be anxiety (2).

The menopausal syndrome is experienced by many women in almost all of the world. Around 70-80% of European anita. 60% of women in America. 57% of women in Malaysia. 18% of women in China 10%, women in Japan and Indonesia(3). In Asia, according to the World Health Organization (WHO), in 2025 the number of elderly women will increase from 107 million to 373 million. In Indonesia, life expectancy from year to year has increased. In 1971 Indonesia's life expectancy was 46.5 years, and in 2005 it reached 68.2 years. Besides that, there was a shift in menopause age from 46 years in 1980 to 49 years in 2000. This increase was also experienced by Lampung Province. Namely

the number of life expectancy in 2002 was 66.1 years to 67.6 years in 2004 and Metro as the highest city, the life expectancy is 71.8 years with a population of pre-age women as many as 8,948 people. Metro Timur Subdistrict area is the number of pre-elderly women as many as 2017 people (4). The results of the preliminary study conducted at the Panglangkek District of Bajur Village, Waru Subdistrict, Pamekasan Regency, through interviews with ten postmenopausal women found that most (75%) of women before menopause experienced anxiety in the face of menopause and 25% did not experience anxiety.

Health problems begin to emerge due to the loss of the hormone estrogen which plays an active role in the work system of female organs. Changes that occur a lot at this time are physical changes, ranging from hair, eyes, skin to other physical organs. Target physical organs such as problems in the breast and vagina, as well as a burning sensation that radiates in the body (hot flushes). Some factors that influence a person's self-concept are the high expectations for work and ideal in a person. Although not an illness, this event has an impact on a woman's life, especially for women who are active, so that it can be felt as a disorder (5). Psychological symptoms at menopause are Moodiness. Anxiety, change in mortality and feelings, emotional lability feel helpless, memory impairment. Reduced concentration. difficult to decide. Feel worthless (6). These symptoms result in changes in self-concept. Stressors that can affect self-concept are a loss of body parts, surgery, pathology of disease, changes in body structure and function, growth and development, procedures and treatment (7). It is estimated that the number of people who suffer from both acute and chronic anxiety reaches 5% of the population, with a comparison between women and men 2 to 1 (8). It is influenced by several factors including the level of education and economic status as well as information sources with a sufficient level of education that someone will be more mature in dealing with all the problems that occur. Information about health is needed for a woman before menopause. With enough information, a person will gain knowledge so they can understand their own needs.

The effort that must be done is to add insight or increase knowledge about the symptoms caused during pre-menopause to anticipate changes - changes that occur in a person. Anxiety often disturbs women aged 40-60 years. These feelings also arise due to a lack of knowledge about menopausal signs and symptoms. Also, information and counseling about the changes in menopause they have not received, causing fear of being ostracized or no longer noticed by family members. It can be overcome by increasing knowledge through counseling and counseling by health workers (Posted, 2008).

The effort that must be done is to add insight into the causes caused during pre-menopause to anticipate changes that occur in a person. Anxiety often disturbs women aged 40-60 years. These feelings also occur. Also, information and counseling about the changes in menopause they have not received, causing fear of being shocked or no longer noticed by family members. It can be overcome by increasing knowledge through counseling and counseling by health workers (Posted, 2008).

METHODOLOGY

The research design used in this study is analytic observational, which examines the relationship between variables that aim to reveal the relationship between variables. With a study cross sectional approach, the type of research that emphasizes the time of measurement of independent and dependent variables is assessed simultaneously at one time, and there is no follow-up (9) .

The population in this study were all women aged 40-60 years in Pangdangkek Hamlet, Bajur Village, Waru District, Pamekasan Regency.

In this study, the researcher used the Probability Sampling technique which is by using simple random sampling which is grouping data based on the area (10).

To collect data, the researcher will use a Closed-Ended Question questionnaire which has been made by the researcher concerning the library consisting of 10 questions for self-concept including, physical changes, body shape, individual way of looking at themselves and psychological stability while 14 statements for anxiety. From the results of the presentation of the questionnaire described descriptively by using a frequency distribution table in the form of a table that is confirmed in the form of percentages and narratives.

To determine the relationship of self-concept with the level of anxiety of women in the face of menopause in the village Pangdangkek Bajur Waru District

Pamekasan. Chi-square statistical test was used with SPSS computerization technique with a significant level of 95% or α = 0.05. This correlation coefficient test is a test to measure the degree of closeness of a relationship between levels or variables in a sequence of levels of other variables with data requirements on ordinal or semi-quantitative scale variables. The degree of significance α = 0.05 means that if p is less than 0.05 HO is rejected and H1 is accepted and if p is more than 0.05, H0 is accepted, and H1 is rejected

RESULTS

In this section, there will be presented the results of research showing the relationship of self-concept with the anxiety of pre-menopause women in Pangdangkek village, Bajur village, Waru sub-district, Pamekasa district.

General Data

Characteristics of respondents based on age. Table 1 Distribution of Frequency of Respondents by Age in Bajur village Based on Table 1 shows that most respondents aged 48-49 years were 42 people (70%)

Characteristics of respondents based on education. Table 2 Distribution of Frequency of Respondents by Education in Bajur Village Based on table 2 shows that most respondents have elementary school education as many as 33 people (55%)

Characteristics of respondents based on work. Table 3 Distribution of Frequency of Respondents by Work in Bajur Village. Based on table 3 shows that most respondents work as farmers as many as 31 people (51.7%)

Characteristics of respondents based on religion. Table 4 Distribution of Frequency of Respondents Based on Religion in Bajur Village. Based on table 4 shows that all Islamic respondents were 60 people (100%)

Characteristics of respondents based on the number of children. Table 5 Distribution of Frequency of Respondents Based on Number of Children in Bajur Village. Based on table 5 shows that almost half of the respondents had 2 and three children each with 23 people (38.3%)

Primary Data

Characteristics of respondents based on self-concept

Table 1 Distribution of Frequency of Respondents Based on Self Concept

Self-concept	Frequency (F)	Percentage (%)
Positive	32	53.3
Negative	28	46.7
Total	60	100

Based on Table 1 shows that most respondents have a positive self-concept as many as 32 people (53.3%)

Characteristics of respondents based on the level of anxiety in the face of menopause

Table 2: Distribution of Frequency of Respondents Based on Anxiety Levels of Premenopausal Women in Facing Menopause

Anxiety level	Frequency (F)	Percentage (%)
No anxiety	0	0
Mild anxiety	36	60
Medium anxiety	16	26.7
Severe anxiety	8	13.3
Very severe anxiety	0	0
Total	60	100

Based on Table 2 shows that most respondents experience mild anxiety as many as 36 people (60%)

The relationship between Self-Concept and Women's Anxiety in Facing Menopause

Table 3 Cross-tabulation of Self-concept and Anxiety of Pre-Menopausal Women in Facing Menopause

Mild anxiety		Anxiety level			Total
		Medium anxiety	Severe anxiety	Very severe anxiety	
Self concept	Positive	30	2	0	32
		93.8%	6.3%	.0%	100.0%
	Negative	6	14	8	28
		21.4%	50.0%	28.6%	100.0%
Total		36	16	8	60
		60.0%	26.7%	13.3%	100.0%
P= 0.000					

Table 3 shows that most respondents (53.3%) as many as 32 respondents had a positive self-concept and experienced mild anxiety as many as 30 people (50%). To find out the relationship between self-concept and women's anxiety in the face of menopause, it was tested using the chi-square test with SPSS 15 for Windows program, it got the result that df 2 with 32.879 person correlation with a significant level of 0.000 <0.05 means that H1 is accepted and Ho is rejected thus there is relationship of self-concept with women's anxiety in the face of menopause in Bajur Village

DISCUSSION

Self-Concept

From the results of the study found that most respondents have a positive self-concept as much as 32 respondents (53.3%) of the total respondents. Self-Concept is how one views size. Appearance and function of the body and its parts [11]. When someone is born to death. Then for 24 hours a day, the individual lives with his body. So that every change in the body will affect the lives of individuals [12]. Changes in body appearance. Like amputation or changes in facial appearance is a stressor that influences self-concept [13]. A realistic view of self. Receiving and liking parts of the body will provide a sense of security to avoid anxiety and increase self-esteem.

With a positive self-concept, one will be more able to accept all forms of change in themselves, so that they will be more confident in their condition. This causes a person to be more able to act positively in every action. In this study, most respondents have a positive self-concept. This is influenced by several factors including the age of a person.

That most respondents are aged 48-49 years. This age range is considered as an adult and has a lot of experience in living life. So they know more about their needs and what they have to do to meet the needs of their families. By the opinion of the more mature someone's age, they will have more experience and knowledge so that they can meet the needs of both the family and themselves.

The anxiety of Premenopausal Women in Facing Menopause

That most respondents experienced mild anxiety as many as 36 respondents (60%). According to [14], that anxiety is a feeling experienced by an individual, such as when he experiences fear. In this anxiety, feeling is vague, unrealistic or unclear object while the object fear is clear. Anxiety is a form of feeling of worry, anxiety and other unpleasant feelings. Usually, these feelings are accompanied by a feeling of lack of confidence, inability, feeling inferior, and unable to deal with a problem. Indecisiveness of individuals in facing a problem and coupled with concerns about things that are not clear are signs of anxiety in individuals. Anxiety

is a psychological reaction to the mental condition of a depressed individual. If people realize that things that can't work well in certain situations will end badly, they will worry. Pressing conditions or situations will cause anxiety [15].

From the description above shows that anxiety is an individual psychological condition in the form of tension, anxiety, anxiety as a reaction to the existence of something that is threatening.

Relationship of Self Concept with Anxiety of Premenopausal Women in Facing Menopause

Based on the cross-tabulation of the relationship between self-concept and pre-menopausal women's anxiety in the face of menopause, the data obtained showed that the majority of respondents (53.3%) as many as 32 respondents had a positive self-concept and experienced mild anxiety as many as 30 people (50%).

Changes in body appearance. Such as amputation or changes in facial appearance is a stressor that clearly affects the self-image[16]. The impact of self-change on a person includes, Refusing to see and touching the changing parts, Not being able to accept changes in the structure and function of the body, Reducing social contact so that there is self-cultivation, feeling or negative view of the body, Preoccupation with body parts or lost body functions, Expressing despair, expressing fear of being rejected, depersonalization, refusing an explanation of body changes. Thus someone will be reluctant to meet other people. But if it is addressed with someone's maturity, it will ease the burden on him. So it doesn't worry too much about the situation.

If someone has a positive self-concept, then anxiety in the face of menopause will decrease. This is evidenced by the results of the above research that most respondents have a positive self-concept and experience mild anxiety.

CONCLUSION

Most respondents have a positive self-concept, some respondents have mild anxiety experiences. Women who have a positive self-concept will experience mild anxiety in the face of menopause.

SUGESTION

The results of this study are expected to add insight and knowledge for respondents especially regarding self-concept and anticipate the occurrence of anxiety in the face of menopause.

Add information about your self with anxiety in the face of menopause

The results of this study can be used as additional references in improving knowledge about the self-concept of pre-menopausal women in the face of menopause. And it is hoped that it can be used as additional reference material in improving health services for the community.

Conflict of interest statement: Nil

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Ethical Clearance: Institutional has no committee ethics.

REFERENCES

1. Davis SR, Lambrinoudaki I, Lumsden M, Mishra GD, Pal L, Rees M, et al. Menopause. Nat Rev Dis Prim. 2015;1.
2. Freeman EW, Sammel MD. Anxiety as a risk factor for menopausal hot flashes: Evidence from the penn ovarian aging cohort. Menopause. 2016;23(9):942–9.
3. the World Bank. The Case for Financial Literacy in Developing Countries. Education. 2009;103–18.
4. Baziad A, Mangunkusumo C. Menopause: Country-specific information of Indonesia. In: First Consensus Meeting on Menopause in the East Asian Region. 1997.
5. Klinge CM. Estrogen receptor interaction with estrogen response elements. Nucleic Acids Res. 2001;29(14):2905–19.
6. Kaufert P, Syrotuik J. Symptom reporting at the menopause. Soc Sci Med Part E Med Psychol. 1981;15(3):173–84.
7. Lee-Flynn SC, Pomaki G, DeLongis A, Biesanz JC, Puterman E. Daily cognitive appraisals, daily affect, and long-term depressive symptoms: The role of self-esteem and self-concept clarity in the stress process. Personal Soc Psychol Bull. 2011;37(2):255–68.
8. Itagi DO and S. Occupational stress of men and women police. Adv Res J Soc Sci. 2016;7(2):175–81.

9. Drennan RD. Relating a Measurement Variable to Another Measurement Variable. In: Statistics for Archaeologists: A Commonsense Approach. 2009. p. 199–222.
10. Taherdoost H. Sampling Methods in Research Methodology; How to Choose a Sampling Technique for Research. Int J Acad Res Manag. 2016;5(2):18–27.
11. Taylor JC, Wiggett AJ, Downing PE. Functional MRI Analysis of Body and Body Part Representations in the Extrastriate and Fusiform Body Areas. J Neurophysiol. 2007;98(3):1626–33.
12. Czapinski J, Sulek A, Szumlicz T. Individual Quality of Life. Contemp Econ. 2011;5(3):113.
13. Morris SPD. The Psychological Aspects of Amputation - Amputee Coalition. amputee coalition. 2008.
14. Dean E. Anxiety. Nurs Stand. 2016;30(46):15–15.
15. Dziubek W, Kowalska J, Kusztal M, Rogowski Ł, Gołębiowski T, Nikifur M, et al. The Level of Anxiety and Depression in Dialysis Patients Undertaking Regular Physical Exercise Training--a Preliminary Study. Kidney Blood Press Res. 2016;41(1):86–98.
16. Cavanagh SR, Shin LM, Karamouz N, Rauch SL. Psychiatric and Emotional Sequelae of Surgical Amputation. Psychosomatics. 2006;47(6):459–64.

The Effect of Use of Edutainment on Changes in Hemoglobin Levels in Adolescents (Case Study of SMPN 4 Banjarbaru)

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ABSTRACT

Anemia is a body condition characterized by deficiency in size and number of erythrocytes or in insufficient hemoglobin levels for the function of O^2 and CO^2 exchange between blood tissues. The prevalence of anemia in adolescents in Indonesia is quite high, namely 21.7% with anemia sufferers aged 5-14 years by 26.4% and 18.4% of patients aged 15-24 years. Banjarabaru City is the highest area of anemia in adolescents in South Kalimantan Province at 58.75%. Efforts that can be made to improve the application of balanced nutrition in adolescents in preventing anemia have not been optimal either direct efforts such as giving tablets blood or not directly through counseling and socialization. another effort to provide information related to nutrition according to their needs, one of which is to provide nutritional education in the form of counseling edutainment. Edutainment is a form of counseling or education that is packaged in the form of fun entertainment. The purpose of the study is to analyze the effect of using edutainment on changes in hemoglobin levels in young women.

The study uses a Quasi Experiment design with a pre-test and post-test group design approach. The number of samples was 90 young women who were taken by purposive sampling technique. The data obtained were then analyzed using Paired T-Test and Wilcoxon statistical tests for paired different tests, and Anova and Kruskall Wallis tests for unpaired different tests, which was then followed by Post Hoc test for Anova test and Mann Whitney test for Kruskall Wallis test. The results of statistical analysis showed that overall the p value obtained was <0.005, this indicates the meaning that edutainment booklet and edutainment video had different effects before and after the intervention was given to changes in hemoglobin levels in adolescent girls.

Keywords: Edutainment, Changes in Hemoglobin Level, Anemia in adolescents

INTRODUCTION

Anemia is a body condition characterized by deficiency in size and number of erythrocytes or in insufficient hemoglobin levels for the function of O^2 and CO^2 exchange between blood tissues[1]. Based on data from the Data and Information Center of the Republic of Indonesia Ministry of Health (2016) the average adequacy of energy consumption for adolescents aged 13-18 years is 72.3% with the proportion consuming <70% of the energy adequacy rate (AKE) of 52.5%. shows that adolescents still consume energy under minimum requirements[2]. The lack of energy needed can lead to anemia. This is corroborated by the 2013 Basic Health Research data showing that the prevalence of anemia in Indonesia is 21.7% with anemia patients aged 5-14 years at 26.4% and 18.4% of patients aged 15-24 years[3].

Nutrition program report data from the South Kalimantan Health Office in 2015 stated that the prevalence of anemia among female teenagers in South Kalimantan was still quite high, amounting to

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29.13% before administration of blood-added tablets. After blood-tablet intervention, the results decreased to 13.64%. Of the 13 Regencies or Cities, Banjarbaru City of 58.75% was the highest problem of anemia among female teenagers before administration of blood-added tablets (TTD) followed by Banjar Regency of 48.92% and Tanah Bumbu Regency of 43.67%. This is corroborated by the results of the 2015 Banjarbaru Nutrition Program report on the highest data in SMP 4 Banjarbaru as many as 82.4% of girls who experience anemia.

Efforts that can be made to improve the application of balanced nutrition in adolescents in preventing anemia have not been optimal, both direct efforts such as giving blood tablets or not directly through counseling and socialization. This is corroborated by the Banjarbaru City Health Office report data that after being given a tablet intervention the blood was still anemic at the second examination, which was as much as 26.17% above the anemia prevalence of South Kalimantan Province which was 17.81%. So it needs other efforts to provide information related to nutrition according to their needs, one of which is by providing nutritional education in the form of counseling edutainment. Edutainment is a form of counseling or education that is packaged in the form of fun entertainment[4].

MATERIAL AND METHOD

The method used in this study is quantitative research with Quasi Experiment design using the pretest and posttest group design approach. This research method is applied to see the effect of media booklets and visual media on changes in hemoglobin levels in young women. This research was conducted at Banjarbaru 4 Middle School with consideration based on secondary data of the Banjarbaru city health service. The population in this study were all female adolescents in grades VII and VIII at Banjarbaru 4 Junior High School, totaling 309 people. The size of the sample in this study was calculated using a formula according to Lemeshow (1997) with a large sample of 81 young women. The dependent variable in this study is the change in Hb level. The independent variables in this study are edutainment booklet, video edutainment, edutainment booklet and video. Data was analyzed by univariate and bivariate.

FINDING

The results of the measurement of anemia levels before and after being given edutainment booklet

Table 1 Distribution of Hemoglobin Levels in Adolescent Edutainment Booklets

No	Hemoglobin Levels	Pretest		Posttest	
		n	%	n	%
1	Anemia	10	33.3	4	13.3
2	Not anemia	20	66.7	26	86.7
	Total	30	100.0	30	100.0

Distribusi kadar hemoglobin sebelum intervensi *edutainment booklet* remaja yang mengalami anemia sebanyak 10 orang (33,3%) terjadi penurunan setelah diberikan intervensi menjadi sebanyak 4 orang (13,3%).

Tabel 2. Efektifitas *Edutainment Booklet* Terhadap Perubahan Kadar Hemoglobin

No	Media	Tes Normality (Sig.)	*Mean Rank*	P-Value
1	Edutainment Booklet	.000	45.32	.001

Based on 4.18 table, the results of the wicoxon test showed p <0.05 which showed that there was a change in hemoglobin level between pretest and posttest in the edutainment booklet group.

The results of statistical analysis on adolescent girls obtained p value <0.05. So that means that there is a difference in the effectiveness of edutainment booklets on changes in hemoglobin levels. Based on table 4.25 shows that the increase in the average value of hemoglobin levels in the group given booklet edutainment intervention is higher at 45.32, thus means that the booklet is more effective in increasing hemoglobin levels than other media in young women.

The results of the wicoxon test obtained p value <0.05, which means that there was a change in hemoglobin level between pretest and posttest in the edutainment booklet group. Based on table 4.6 the distribution of hemoglobin levels before the edutainment intervention of adolescent

booklets that experienced anemia were 10 adolescents (33.3%) decreased after being given intervention for 12 weeks as many as 4 meetings to be 4 adolescents (13.3%). This shows that the edutainment booklet affects changes in hemoglobin levels, this is due to the occurrence of increased knowledge, attitudes and behavioral changes in the fulfillment of balanced nutrition. This data is supported also by the results of the edutainment booklet media questionnaire in the appendix that has been made which shows that 97.5% of teenagers consider edutainment booklets interesting, 100% of teenage girls understand the contents of edutainment booklet media, 100%, like edutainment booklets, 100% edutainment booklet media increase knowledge about anemia for adolescents, 100% of edutainment booklet media increases insight on prevention of anemia in adolescents, 100% of edutainment media booklet contains about how to drink blood tablets, 100% of teenagers after reading edutainment media booklet agree to prevent anemia and average results the average questionnaire showed 99.75%. In addition, booklets can also be taken home, so that subjects can read or study them.

The results of Listiana research (2016) showed that health education with booklet media had an effect on changes in hemoglobin levels in children in elementary schools with a significant value of 0.043. Nutrition education or counseling is an educative approach to produce individual or community behavior that is needed to improve food improvement and nutritional status[5]. This is also corroborated by the Adirsa study (2005) that the results of paired t-test hemoglobin levels in the treatment group before and after the intervention showed $p < 0.05$, which means there is a significant difference in hemoglobin levels[6]. According to Peymen (2016) The level of knowledge and behavior in food selection will ultimately affect the nutritional state concerned[7].

CONCLUSION

1. Edutainment booklets affect hemoglobin levels in young women.

2. Edutainment booklets are effective for increasing hemoglobin levels in young women.

Ethical Clearance: this study approved and received ethical clearance from the Committee of Public Health Research Ethics of Medical Faculty, Lambung Mangkurat University, Indonesia. In this study we followed the guidelines from the Committee of Public Health Committee of Public Health Research Ethics of Medical Faculty, Lambung Mangkurat University, Indonesia for etchical clearance and informed consent. The informed consent included the research tittle, purpose, participants right, confidentiality and signature.

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Conflict of Interest: The authors declare that they have no conflict of interest.

REFERENCES

1. Almatsier, Sunita. Pinsip Dasar Ilmu Gizi. Penerbit: PT Gramedia Pustaka Utama. Jakarta, 2009
2. Infodatin. Situasi Gizi di Indonesia. Penerbit: Pusat Informasi Gizi Kementrian Kesehatan RI. Jakarta, 2016
3. Kementerian Kesehatan Republik Indonesia. Riset Kesehatan Dasar. Penerbit: Badan Penelitian dan Pengembangan Kesehatan Kementerian Kesehatan Republik Indonesia. Jakarta, 2013
4. Dinas Kesehatan Provinsi Kalimantan Selatan. Laporan Program Gizi Kalimantan Selatan. Dinkes Kalsel. Banjarmasin, 2015
5. Listiana, Akma. Analisis Faktor-Faktor Yang Berhubungan dengan Kejadian Anemia Besi Pada Remaja Putri Di SMKN Terbanggi Besar Lampung Tengah. Jurnal Kesehatan.2016;7(3):455-469.
6. Adirsa, Riza. Edutainment (Education and Entertainment) Sebagai Strategi Baru Penyuluhan Kesehatan. Jakarta: Prosiding Temu Ilmiah, Kongres Nasional XIII dan Festival Gizi Persatuan Ahli Gizi Indonesia (PERSAGI). Bali, 2005
7. Peyman, Nooshin, Abdollahi, Monireh. Using Of Information-Motivation-Behavioral Skills Model On Nutritional Behaviors In Controlling Anemia Among Girl Students. Journal Of Research and Health, 2016.

Relationship between Folate Receptor Alpha (FRα) with Estrogen Receptor, Progesterone Receptor, Her-2 Neu Expression in Breast Carcinoma

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ABSTRACT

Folate alpha receptor (FRα) was a membrane receptor protein of glycosyl-phosphatidyl-inositol, which used as an antigen marker and also as a new molecular subtype in breast carcinoma with complex and heterogeneous genetic disorders. This study aimed to determine a relationship among FR alpha expression with Estrogen receptor (ER), Progesteron Receptor (PR), and HER-2 expression in breast carcinoma. This was observational study with a cross-sectional design, FR alpha expression was confirmed by immunohistochemistry methods, ER / PR alpha expression using Allred Score (1998), Human Epidermal Growth Factor Reseptor -2 (HER-2) expression according to ASCO and Cap (2013), histopathological grading based on Nottingham Modification of The Bloom Richardson System. The total sample for this study was 75 samples of breast carcinoma patients. This study showed FR alpha expression was not significantly associated with alpha ER / PR expression ($p = 0.887$) and histopathological degree ($p = 0.190$), but FR alpha expression was significantly associated with HER-2 overexpression ($p = 0.037$) in breast carcinoma. Overexpression FR alpha was more dominant in breast carcinoma with a poor and aggressive prognosis.

Keywords: *Breast Carcinoma, FR alpha, ER-alpha, PR alpha, HER-2 neu.*

INTRODUCTION

Breast cancer was a complex and heterogeneous disease, had different histological and molecular features, behavior and varied therapy responses. Heterogeneous breast cancer morphology was related to specific molecular profiles, which could be investigated with gene expression.[1] Estrogen receptor (ER), Progesteron Receptor (PR) and Human Epidermal Growth Factor Reseptor -2 (HER-2) reported as biomarkers related to clinical and biological behaviors in breast cancer.[2,3] Folate Receptor Alpha (FRα) expression in breast cancer showed new and unique molecular subtypes and was useful for therapeutic interventions. It was 74% overexpression of FRα in breast cancer with negative ER/PR.[4]

FRα was a membrane protein of glycosylphosphatidylinositol (GPI-anchored), encoded by FOLR1 genes consisted of 257 amino acids. [5-7] FRα overexpression found in solid tumors, such as ovarian, breast and lung carcinomas.[8] However, it was a low expression in healthy human tissue.[9] Overexpression of FRα affected to the growth of cancer cells through direct or indirect mechanisms with the uptake of folic acid.[4]

Hansen et al., revealed a new transduction pathway initiated by folic acid and folinic acid bonded with FRα which resulted to cellular response through gp 130 co-receptors accompanied by JAK and STAT activations. Activation of STAT 3 oncogenes conducted by folic acid and folinic acid increased the complexity of the role of vitamin B9 in one-carbon metabolism. This pathway influenced several cellular processes through cell division, angiogenesis, metastasis and inhibited cancer cell apoptosis.[10]

This study aim were Examining the importance of FR alpha as a marker of targeting therapy in breast cancer.

MATERIALS DAN METHOD

Collection of Samples

This was observational research with a cross-sectional design. The study sample was a population of breast carcinoma patients, diagnosed based on histopathological examination and performed ER/ PR/ Her-2 immunohistochemistry examination at the Makassar Pathology Diagnostic Laboratory, from January to December 2017.

Inclusion criteria: Block paraffin tissue of breast carcinoma carried out by ERα, PRα, Her-2 Immunohistochemistry examination which processed according to standard procedures.

Exclusion criteria: damaged paraffin blocks of breast tissue. Amount of samples which met inclusion and exclusion criteria were 75 paraffin blocks of breast carcinoma.

Pathological Review

Histopathological features of breast carcinoma were examined using hematoxylin-eosin staining. Scaled based on the Nottingham Modification of the Bloom Richardson System. Immunohistochemistry examination of ER / PR alpha evaluated based on Allerd 1998 score and Her-2 neu evaluated based on ASCO and Cap 2013.

Immunohistochemistry Evaluation of FR α expression

The Immunohistochemistry scores and evaluation results of FR alpha were assessed by two pathologists. Colored FR alpha expression was seen in the cell membrane and scaled based on the study of O'Shannessy D.J, et al. (2012) and set cut-off score of the cell colored percentage (> 5%) with the intensity of any color, then divided expression score into:

A. 3+ score, Cell Membrane has strongly colored at four times Obj magnification and confirmed with ten times Obj

B. Score 2+, Cell Membrane was moderate colored at ten times obj magnification of obj and established with obj 20 times

C. 1 + score, cell membrane was weakly colored at 20 times or 40 times obj magnification

D. 0 score, no cell membrane was stained with obj 20 times and 40 times

Data Analysis

Data analysis using Statistical Package for Social Science version 24. Analysis of relationship among expression FRα and clinicopathological criteria used chi-square test, with $P<0.05$.

RESULTS

Clinicopathological characteristics

In this study, there were 75 samples in the age range of 29-80 years old, the highest frequency in the age group (43 samples) was less than 50 years old(57.3%). Based on histopathological grading there were nine samples (12%) with low-grade breast carcinoma, 34 samples (45.3%) with moderate grade breast carcinoma and 32 samples (42.7%) with high-grade breast carcinoma. The study sample consisted of 25 samples (33.3%) with positive alpha ER / PR expression and 50 samples (66.7%) with negative alpha ER / PR expression. Regarding receptor marker and Her-2 status, It was divided into three groups, included Negative ER / PR / Her-2 group; Her / 2 Positive ER / PR Negative; Positive ER / PR Her-2 Negative / Positive, and each group consisted of 25 samples (33.3%). While positive Her-2 status was 29 samples (38.7%) and negative Her-2 status was 46 samples (61.3%) showed in Table 1.

Table 1. Percentages Characteristic of Respondents

Characteristics	Results	n	%
Age	< 50 yo	43	57.3
	≥ 50 yo	32	42.7
Histopathological Grading	Low Grade	9	12
	Moderate Grade	34	45.3
	High Grade	32	42.7

Cont... **Table 1. Percentages Characteristic of Respondents**

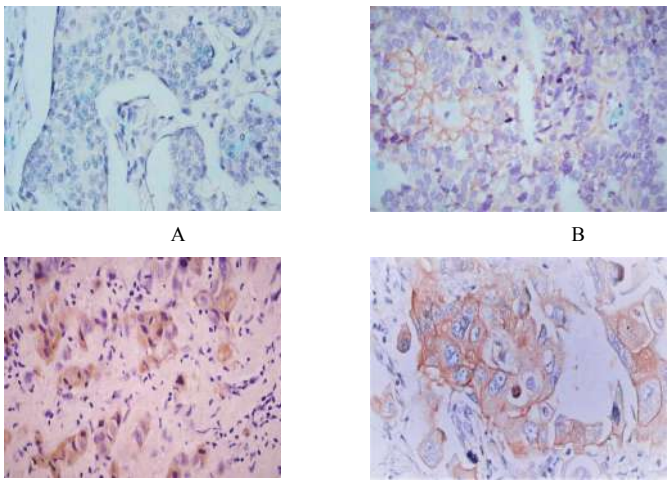
Marker	ER/PR/Her-2 Negatives	25	33.3
	ER/PR Negative Her-2 Positif	25	33.3
	ER/PR Positive Her-2 Negative/Positif	25	33.3
Her-2 Status	Positive	29	38.7
	Negative	46	61.3
Expression of ER/PR alpha	Positive	25	33.3
	Negative	50	66,7
Expression FR alpha	Positive	29	38.7
	Negative	46	61,3
score of Expression FR alpha	0	46	61.3
	1+	12	16
	2+	8	10,7
	3+	9	12

Immunohistochemistry expression of FRα in breast carcinoma

The results of this study showed 29 samples (38.7%) were expressed positively and 46 samples (61.3%) were expressed negatively in breast carcinoma. The intensity of FR alpha expression from the score range 0 to +3, the highest frequency was the group with FR alpha 0 expression score (61.3%), then the group with +1 score (16%), +3 score (12%), +2 score (10.7%) showed in figure 1. showed in figure 1.

Although statistically there was no significant relationship among FRα expression and patient age and histological grading, however breast carcinoma with high histological grading which resulted to expression FRα was 43.8% shown in Table 2.

The relationship among FRα expression with ER/PR alpha expression, Her-2 neu, where FR alpha expression was significantly associated with Her-2 status (P = 0.037). However, ER / PR alpha expression there was no significant relationship with Her-2 status (P = 0.887). It could be seen that FRα was more expressed in breast carcinoma with negative alpha ER/PR of (40%) and ER- / PR- / Her-2 + group of (52%) was shown in Table 3.



A B C D

Figure 1. Folate Receptor Alpha expression in breast carcinoma

Negative membranous and cytoplasmic Immunohistochemistry expression of FR α in breast carcinoma (obj 40x)

Positive 1, weak membranous and cytoplasmic Immunohistochemistry expression of FR α in breast carcinoma, (obj 40 x).

Positive 2, moderate membranous and cytoplasmic Immunohistochemistry expression of FR α in breast carcinoma, (obj 40 x).

Positive 3, strong membranous and cytoplasmic Immunohistochemistry expression of FR α in breast carcinoma, (obj 40 x).

Table 2. Clinicopathological characteristics of breast carcinoma based on Immunohistochemistry expression.

Clinicopathological Parameters	Expression of Folate Receptor Alpha				Total	P value
	Positive		Negative			
	Amount	Percentage	Amount	Percentage		
Age						
< 50 yo	16	37,2 %	27	62,8 %	43	0,95
≥50 yo	13	40,6 %	19	59,4 %	32	
Histological Grade						
High Grade	14	43,8 %	18	56,3 %	32	0,190
Moderate Grade	14	41,2 %	20	58,8 %	34	
Low Grade	1	11,1 %	8	88,9 %	9	

Table 3. A Relationship among Expression FR alpha with ER, PR alpha and Her-2 neu (N=75)

Receptor	Expression of FR alpha				Total	P Value
	Positive		Negative			
	Amount	Percentage	Amount	Percentage		
Marker						
ER/PR/Her-2 Negative	7	28%	18	72%	25	0,207
ER/PR Negative Her-2 Positive	13	52%	12	48%	25	
ER/PR Positive Her-2 Negative/Positive	9	36%	16	64%	25	
Her-2Status						
Positive	16	55,2 %	13	44,8 %	29	0,037
Negative	13	28,3 %	33	71,7 %	46	
Expression ER/PR alpha						
Negative	20	40%	30	60%	50	0,887
Positive	9	36%	16	64%	25	

DISCUSSION

Breast carcinoma subtypes distribution differences based on age, race, staging, grading Bloom-Richardson, tumor size, and lymph node status.[11]

FR alpha was a glycosyl-phosphatidylinositol (GPI) protein anchored in the cell membrane with high affinity for binding and transporting folate whereas folate acted as a one-carbon metabolism in essential components of cell metabolism, DNA synthesis, and reproduction, as well as rapid cancer cell division. Therefore, it was found high expression levels in malignant tumors from epithelium compared to healthy cells.[12]

In this study, breast carcinoma expressing FR alpha was only 38.7% of the total sample. There was a meaningful relationship among FR alpha expressions with Her-2 status with a value of $p < 0.05$. This showed that breast carcinoma with Her-2 status could affect the expression of FR alpha.

During the Her-2 phosphorylation process, in spite of inducing downstream intra-cell signaling, it also activated genes associated with cell growth.[13] One of them was the FOLR gene 1. Previous research of Necela, et al., it was stated that breast tumors with Her-2 positive could express FR alpha.[14]

The role of Her-2 neu as a critical driver of cell growth was one of the transmembrane receptors of epidermal growth factor (EGF) receptor family, which was encoded by the erbB-2 gene. This gene amplification could result in 18-20% overexpression of Her-2 in phenotypic breast carcinomas that were more aggressive. Her-2 could activate three central signaling pathways, namely: Ras/Raf/MAPK, JAK/Stat, and PI3K/AKT/m-TOR. Those affected by cell growth and survival, proliferation, division, metabolism, apoptosis and migration ability. Therefore, tumors with Her-2 was classified as a tumor with a poor prognosis.[15-17]

Also, phosphorylation of serine and threonine from the erbB-2 gene could be stimulated by the PKC enzyme activated by phorbol ester.[18] According to Elnakat et al., recycling FR required enzyme protein kinase C alpha (PKCα), which was activated by diacylglycerol and phorbol ester to bind RACK 1 receptor. Thus it increased FR alpha amount on the cell surface.[19] This showed that indirectly PKC enzyme pathways could increase expression of FR alpha and Her-2 neu in breast carcinoma.

Regarding important role of PKC enzymes in some cascade signal transductions, receptor desensitization also functioned, such as membrane structure modulation, transcription regulation, immune system mediation, regulation of cell growth and learning and memory processes.[20] Therefore, the understanding of the regulatory process of FR alpha recycling through the PKC pathway, it also functioned as effective drug delivery.

In other research results, it was found that there was no significant relationship among FR alpha expression with ER/PR expression in breast carcinoma. However, it showed that FRα was more expressed in breast carcinoma with negative alpha ER/PR at (40%) and ER-/PR-/ Her-2 + (52%). This stated that FR alpha expression affected by hormonal receptors (ER/PR) with steroid hormone especially estrogen.[12] It was known that regulation of FR alpha expression was very complicated depending on the subtype of breast carcinoma.[14]

Kelemen L.E et al., stated that regulation of gene expression and protein FOLR1 depended on the concentration of extracellular folate, the level of intracellular homocysteine, other transcription and translation rules, epigenetic regulation, hormonal regulation, and genetic mutation.[9]

Kelley et al. stated that promotor of FR alpha gene was repressed by 17-β estradiol/ER bonds in promotor of P4 area, then, it was depressed by antiestrogen tamoxifen. ER alpha corepressor in the form of SMRT played a role in increasing repression of FR alpha gene promoters with 17-β estradiol/ER. Therefore, breast carcinoma with ER was positive directly and actively repressed expression of FR alpha.[12]

It is known that corepressor was an essential regulator of ERα-mediated work, while transcription activation conducted by ER alpha was complex and multi steps. If this corepressor was lost, it affected breast cancer growth and resistance to endocrine therapy.[21] This multiprotein complex had effects through several mechanisms depending on the type of corepressor and chromatin remodeling, histone deacetylation (HDACs) or basal transcription. In the transcription process of the FR alpha gene, the SMRT and NCor corepressors played a role in repressing transcription factor via HDACs in Ligand Binding Domain (LBD) area.[22]

On the contrary with the progesterone receptor (PR alpha) which indirectly increased regulation of the FOLR gene 1, androgen and glucocorticoid hormones could activate and improve control of the FOLR 1 gene.[23]

Regarding biological regulatory processes of the FOLR 1 gene and other influential factors, the role of this gene in breast carcinogenesis was understood. Therefore, a new therapy for breast carcinoma with a low toxicity effect could be developed.

A variant of other previous research was probably related to the presence of polymorphism from the FOLR 1 gene, sample size differences and evaluation method differences of expression of FR alpha.

CONCLUSION

This research found that FRα expression was present in breast carcinoma with a poor and aggressive prognosis. Suggested to use FRα immunohistochemistry examination as additional prognostic factors in breast carcinoma.

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REFERENCES

1. Hanby AM, Cosar EF. Precision Molecular Pathology of Breast Cancer [Internet]. 2015;10. Available from: http://link.springer.com/10.1007/978-1-4939-2886-6
2. Dowsett M. Benefit from adjuvant tamoxifen therapy in primary breast cancer patients according to the estrogen receptor, progesterone receptor, EGF receptor and HER2 status. Ann Oncol [Internet]. 2006;17(5):818–26. Available from: https://academic.oup.com/annonc/article-lookup/doi/10.1093/annonc/mdl016
3. Prihantono, P et al. Ki-67 expression by immunohistochemistry and quantitative real-time polymerase chain reaction as predictor of clinical response to neoadjuvant chemotherapy in locally advanced breast cancer. Journal of oncology, 2017; 8. https://doi.org/10.1155/2017/6209849
4. O'Shannessy DJ, Somers EB, Maltzman J, Smale R, Fu Y-S. Folate receptor alpha (FRA) expression in breast cancer: identification of a new molecular subtype and relationship with triple negative disease. Springerplus [Internet]. 2012;1(1):22. Available from: http://springerplus.springeropen.com/articles/10.1186/2193-1801-1-22
5. Vargas AMM. The role of the Soluble Folate Receptor Alpha in cancer development. 2015;1–46.
6. Wibowo AS, Singh M, Reeder KM, Carter JJ, Kovach AR, Meng W, et al. Structures of human folate receptors reveal biological trafficking states and diversity in folate and antifolate recognition. Proc Natl Acad Sci [Internet]. 2013;110(38):15180–8. Available from: http://www.pnas.org/cgi/doi/10.1073/pnas.1308827110
7. Cheung A, Bax HJ, Josephs DH, Ilieva KM, Pellizzari G, Opzoomer J, et al. Targeting folate receptor alpha for cancer treatment. Oncotarget [Internet]. 2016;7(32):52553–74. Available from: http://www.oncotarget.com/fulltext/9651
8. Boogerd LSF, Boonstra MC, Beck A, Charehbili A, Hoogstins CES, Prevoo HAJM, et al. Concordance of folate receptor-α expression among biopsy, primary tumor, and metastasis in breast cancer and lung cancer patients. 2016;7(14).
9. Kelemen LE. The role of folate receptor ?? in cancer development, progression, and treatment: Cause, consequence or innocent bystander? Int J Cancer. 2006;119(2):243–50.
10. Hansen MF, Greibe E, Skovbjerg S, Rohde S, Kristensen ACM, Jensen TR, et al. Folic acid mediates activation of the pro-oncogene STAT3 via the Folate Receptor alpha. Cell Signal [Internet]. 2015;27(7):1356–68. Available from: http://dx.doi.org/10.1016/j.cellsig.2015.03.020
11. Vogel VG. 15 - Epidemiology of Breast Cancer [Internet]. Fifth Edit. The Breast. Elsevier Inc.; 2015. 207-218.e4 p. Available from: http://dx.doi.org/10.1016/B978-0-323-35955-9.00015-5
12. Kelley KMM, Rowan BG, Ratnam M. Modulation of the folate receptor a gene by the estrogen receptor: mechanism and implications in tumor targeting. Cancer Res. 2003;63(11):2820–8.
13. Hayashi N, Iwamoto T, Gonzalez-Angulo AM, Ferrer-Lozano J, Lluch A, Niikura N, et al. Prognostic impact of phosphorylated HER-2

in HER-2+ primary breast cancer. Oncologist [Internet]. 2011;16(7):956–65. Available from: http://www.pubmedcentral. nih.gov/ articlerender. fcgi?artid=3228141&tool= pmcentrez& rendertype=abstract

14. Necela BM, Crozier JA, Andorfer CA, Lewis-Tuffin L, Kachergus JM, Geiger XJ, et al. Folate receptor-α (FOLR1) expression and function in triple negative tumors. PLoS One, 2015;10(3). http://dx.doi.org/10.1371/journal.pone.0122209
15. Orioles P, Bosch A, Alejandro Pérez-Fidalgo J, Lluch A. Molecular biology in breast cancer: Intrinsic subtypes and signaling pathways. Cancer Treat Rev. 2012;38(6):698–707. http://dx.doi.org/10.1016/j.ctrv.2011.11.005
16. Mohamed A, Krajewski K, Cakar B, Ma CX. Targeted therapy for breast cancer. Am J Pathol [Internet]. 2013;183(4):1096–112. Available from: http://dx.doi.org/10.1016/j.ajpath.2013.07.005
17. Carlsson, Jörgen, et al. HER2 expression in breast cancer primary tumours and corresponding metastases. Original data and literature review. British journal of cancer, 2004, 90.12: 2344.
18. Hynes NE, Stern DF. The biology of erbB-2/nue/HER-2 and its role in cancer. BBA - Rev Cancer. 1994;1198(2–3):165–84.
19. Elnakat H, Gonit M, Salazar MDA, Zhang J, Basrur V, Gunning W, et al. Regulation of folate receptor internalization by protein kinase C. Biochemistry. 2009;48(34):8249–60.
20. Newton, Alexandra C. Protein kinase C: structure, function, and regulation. Journal of Biological Chemistry, 1995, 270.48: 28495-28498.
21. Prihantono, P et al. Correlation of BCL-2 and ERα mRNA Expression with the Clinical Chemotherapeutic Response in Breast Cancer. J. Med. Sci, 2017, 17.1: 31-37.
22. Dobrzycka KM, Townson SM, Jiang S, Oesterreich S. Estrogen receptor corepressors - a role in human breast cancer? Endocr Relat Cancer. 2003;10(4):517–36.
23. Lu, Yingjuan; Leamon, Christopher P. Targeting activated macrophages via a functional folate receptor for potential treatment of autoimmune/inflammatory disorders. In: Targeted Drug Strategies for Cancer and Inflammation. Springer, Boston, MA, 2011. p. 195-216.

Study of Quality of life at Worker User Train *Commuter line* and TransJakarta Busway Bogor - Jakarta 2018

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ABSTRACT

Many studies have concluded that commuting activities have an impact on the quality of life of commuters on physical, mental / psychological, health, and social / environmental aspects. The objective of this study is to determine the quality of life of commuting workers who use busway Transjakarta and train commuter line modes of transportation from Bogor to Jakarta and the influencing factors. This study was conducted using cross sectional design with WHO Quality of Life BREF questionnaire. The result was analyzed using univariate and bivariate by Chi square. The result shows the respondents have used train commuter line for ≥ 4 years (50.6%) while workers using the Transjakarta for <4 years are 52.5% with the frequency of ten times a week for train commuter line (72.4%). The quality of life of the users of commuter line and busway Transjakara is categorized as good by percentage of 57.1% and 70%. The psychological and environmental domains have the highest scores on both transportation modes, while the physical domain has the lowest score. The bivariate analysis reveals that the quality of life of workers using train commuter line is affected by income and psychological conditions, while that of the workers using busway Transjakarta is affected by the types of work

Keywords: *Quality of Life, WHOQOL- BREF, Worker Commuter, Busway Transjakarta, KRL Commuter line*

INTRODUCTION

Many previous studies concluded that commuting affects the quality of life of commuters on the physical and mental/psychological aspects, as well as their health, and social/environment [1-6]. The psychological aspect of the commuters are also affected, for example they become stressed out while commuting that increases bad mood which can cause anxiety, low tolerance, frustration [1, 4, 7, 8], impatience while driving [9,10], and feeling unhappy. Another study found the level of quality of life and happiness of commuters using public transportation is lower than non-commuters [4,11].

Besides the physical and psychological effects, commuting also affects the social aspect, i.e. social capital/modal. Commuters tend to limit their free time for social and recreational activities and create negative externalities in the community by reducing participatory activities[12]. In fact, social capital can be the resource that arises from social relations in the community that can be used to solve problems both individually and collectively[13]. Moreover, another study showed that public transportation commuters with longer duration had lower community social participation[13].

Another study presented that the duration of commuting leads to higher health risk if the commuters use private cars rather than public transportation. Car users have lower health condition, lower life satisfaction and higher Body Mass Index than public transportation commuters[6]. Commuter line users can also be potentially exposed to Particulate Matter (PM) and Ultrafine Particles (UFPs)[14,15], respiratory tract problems due to air pollution[15]. Air pollution produces pollutant, including particulate matter (PM), carbon monoxide (CO), nitrogen dioxide (NO_2), volatile organic compounds (VOCs), and polycyclic aromatic hydrocarbons (PAHs)[16].

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Based on the background and description above, the objective of this research is to elaborate the quality of life of commuter line workers that use Transjakarta Busway and commuter line train from Bogor to Jakarta and the factors that affect it.

METHOD

This study was conducted using a cross sectional design. The samples of this study are respondents from commuters/users who started their commute to work from Bogor station and Depok station, and the Transjakarta Busway users who started their commute to work from Cibinong terminal and Bogor terminal to their destination, Jakarta in April until June 2018. The total respondents were 196 people. The primary data of this study were collected using WHOOOL-BREF questionnaire and trip-inconvenience questionnaire, Health Conditions, Psychological Conditions, and Bad Experience. The data were analyzed using univariate descriptive and bivariate by Chi square test using SPSS 20 software.

RESULTS

This following is the social demographic characteristic of workers using commuter line train and workers using Transjakarta Busway based on their age, gender, educational level, type of job, income, marital status, number of children, duration the transportation mode usage, and frequency of using mask.

Table 1 : Social Demographic Characteristic Workers Using Commuter Line Train and Workers Using Transjakarta Busway (N=156) and Busway Transjakarta (N=40)

Respondents' Characteristics	Commuter Line Train Percentage		Transjakarta Busway	
	n	Percentage	n	Percentage
Age				
≤ 29 years old	71		13	32.50
> 29 years old	85		27	67.50
		45,5		
		54,5		
Gender				
Male	82	52.6	23	57,50
Female	74	47.4	17	42.50
Educational Level	13	8,3	1	2,50
Middle/High School	143	91,7	39	97,5
College (Diploma/Bachelor/ Magister/ Doctoral)				
Type of Job				
Government Employee(s)	46	29,5	9	22,5
Private Company Employee(s)	85	54,4	22	55,0
Entrepreneur(s)	6	3,8	3	7,50
Others	19	12,2	6	15,0
Income (IDR)				
3 million – 6 million	56	35,9	13	32,5
6 million – 9 million	52	33,3	13	32,5
9 million – 12 million	25	16,0	6	25,0
> 12 million	23	14,7	8	20,0
Marital Status				
Single	61	39,1	12	30,0
Married	95	60,9	28	70,0
Duration of Transportation Mode Usage (years)				
< 4 years				
>= 4 years	77	49,4	21	52,5
	79	50,6	19	47,5

Cont... **Table 1 : Social Demographic Characteristic Workers Using Commuter Line Train and Workers Using Transjakarta Busway (N=156) and Busway Transjakarta (N=40)**

Frequency of Transportation Mode Usage (in week)				
< 10 times	43	27,6	21	52,5
≥ 10 times	113	72,4	19	47,5

Quality of life of commuter line train users and Transjakarta Busway users include physical domain, psychological domain, social relations domain, and environmental domain. The first domain score of commuting workers of the commuter line train and Transjakarta Busway is physical condition (physical domain), the score from second domain is the psychological condition (psychological domain), the third domain score is social relation of the commuting workers using commuter line train and Transjakarta Busway. The fourth domain score is the environmental condition of the commuting workers using commuter line train and Transjakarta Busway.

Hereafter, to make the analysis easier, the researcher grouped the quality of life score into two parts, namely poor and good, based on the respondents' answer regarding their quality of life, with the result that the commuting workers of the commuter line train has a good quality of life by 57,1% and poor quality of life by 42.9%. On the other hand, the Transjakarta Busway users has a good quality of life by 70% and poor quality of life by 30% as presented in Table 2 below.

Table 2 : Respondents Distribution Based on Quality of Life Level

Quality of Life	**Commuter Line Train**	**Transjakarta Busway**
	Frequency	**Percentage**
Less/ Poor	67	42.9
Good	89	57,1

The result of the bivariate analysis to see the correlation between two variables as presented in table 3, namely the relation of quality of life with social demography of commuter workers of commuter line train and Transjakarta Busway, which is correlated with the income and type of job.

Table 3: Correlation of Quality of Life with Social Demography of Commuter Workers of Commuter Line Train and Transjakarta Busway

Variable	QOL Commuter Line		P value	OR	QOL Transjakarta		P value	OR
	Poor	Good			Poor	Good		
Age					Gender			
≤ 29 years old	32	39	0,744	1,172 (0,620 – 2,215)	Male	5	9	33	0,720	49	1,508 (0,374 – 6,092)	0,578	0,752 (0,420 – 1,496)
> 29 years old	35	50			Female	7	19	34		40			

Educational Level								
High School	6	7	1,000	1,152 (0,369 – 3,602)	0	1	1,000	1,444 (1,172 – 1,781)
College	61	82			12	27		
Type of Job								
Government	18	18		1,767 (0,265 – 2,836)	0	9	**0,043***	~
Private Company	34	51	0,304	1,200 (0,354 – 2,289)	9	13		0,289 (0,204-16,512)
Entrepreneur(s)	2	4		0,277 (0,182 – 7,926)	2	1		0,100 (0,065 – 6,871)
Others	13	6		1,667 (0,078 – 0,988)	1	5		5,000 (0,065 – 6,871)
Income								
3 – 6 million	32	24		0,758 (0,988 – 4,605)	6	7		4,714 (0,056 – 2,697)
6 – 9 million	20	32	**0,011***	0,529 (0,656 – 4,391)	2	11	0,373	1,714 (0,204-16,512)
9– 12 million	11	14		1,846 (1,905 – 21,05)	2	4		2,571 (0,065 – 6,871)
> 12 million	4	19		-0,288	2	6		1,167 (0,065 – 6,871)
Marital Status								
Single	29	32	0,446	1,359 (0,710 – 2,601)	6	6	0,130	3,667 (0,862 – 15,59
Marriage	38	57			6	22		
Duration								
< 3 and 4 years	35	43	0,746	1,170 (0,620 – 2,207)	9	12	0,128	4,000 (0,887 – 18,03
>= 3 and 4 years	32	46			3	16		
Frequency								
< 10 times	27	26	0,202	1,636(0,838 – 3,192)	5	16	1,000	0,536 (0,136 – 2,10)
≥ 10 times	40	63			7	12		

DISCUSSION

The profession with the highest percentage among the commuter workers of commuter line train is Private Company Employees by 54.4%, so does with the users of Transjakarta Busway by 55%. It is in line with Central Bureau of Statistics survey data on 2014[17] that the the business fields with the biggest number of commuter workers of commuter line train include industries, trade, social services, social, and accommodation. These business fields need employees as labor/manpower, which means that most workers are private company employees.

The amount of income with the highest percentage among commuter workers of commuter line train is 3 – 6 million by 35.9%, as is Transjakarta Busway workers by 32.5%. The DKI Jakarta Provincial Minimum Salary in 2018 is Rp. 3,600,000.00. It means that the average income of the respondents working in Jakarta is in accordance with DKI Jakarta Provincial Minimum Salary.

The biggest inconvenience of the trip felt by commuter line users is the crowded condition, meanwhile the lowest is accidents. For the Transjakarta Busway users, the biggest inconvenience of the trip was traffic jam, and the lowest perceived was noise. Crowded condition was the most affecting the inconvenience perceived by commuter line train users. The researcher believes that crowded condition occurs due to the large number of workers using commuter line train. The result of a survey conducted by Central Bureau of Statistics in 2014[17] indicate that there were 149,921,245 users of the commuter line train from Bogor to Jakarta.

For health condition, the complaint with the highest percentage from commuter line users is muscle aches, meanwhile the lowest percentage is nausea. It is the same as Transjakarta Busway users that the complaint with the highest percentage is muscle aches, meanwhile the lowest percentage is nausea. Bowling (2001)[18] stated that the transportation problem is one factor correlated with quality of life level that can cause health condition.

For psychological condition, the highest perceived by commuter line train users is inconvenience/discomfort, meanwhile the lowest perceived is the miserable situation, and so are with Transjakarta Busway users. These are caused by the condition inside the commuter line train or Transjakarta Busway which can be filled with passengers causing the passengers to jostle. For bad experience, the most experienced by commuter line users

is schedule delay, while the most infrequent occurrence is accident, and so are for Transjakarta Busway users.

The commuter workers on both commuter line train or Transjakarta Busway obtain lowest score to physical domain. Temporarily, it can be said that the workers has lack of ability to resolve the factors that affect physical condition, such as illness, sleep quality, energy and fatigue, mobility, activities in daily life, dependence on medication or medical therapy. The most common factor experienced by commuter line train and Transjakarta Busway workers is in terms of sleep quality problems. It is possible because the factors of fatigue and daily routines caused by waking up early and going home from work late at night are related to the workers having to pursue the commuter line train or Transjakarta Busway schedule.

The domains of commuter line train and Transjakarta Busway workers with the highest score are psychological and environmental domains. For the moment, it can be said on both commuter workers of commuter line train and Transjakarta Busway have better psychological and environmental domain compared to physical and social domain. Also, both of those have good quality for psychological and environmental condition. The environmental domain includes financial source, freedom, physical safety, dan security, health treatment, and social care, homey feeling, the opportunity to get and receive a lot of new information and new skills, the opportunity to do recreation or activities, physical environment, and transportation.

For psychological domain, it can be said that commuter line train and Transjakarta Busway users have good capability/ability such as bodily and appearance, positive and negative perceived, self-esteem, thinking, learning, memory and concentration, and spiritual aspect.

In this research, the factors correlating with quality of life of commuter line train workers are psychological condition and income, meanwhile for Transjakarta Busway workers there is no dominant variable. Social demographic factors influence the quality of life among Indonesian workers, as well as job characteristics (work status, work shift and work area condition), individual characteristics (educational level) and lifestyle (sleep duration and exercise habit)[19]. Other study found lifestyle, working characteristics, workplace conditions were associated with QOL among SME workers in South East Asian Countries[20]. Another previous study by Dalkey (2002)[21] found the influence from demographic factor is income with subjective perceived quality of life. It is presented that the respondents who make less than the Provincial Minimum Salary are more at risk to experience stress than workers whose income is above the Provincial Minimum Salary.

CONCLUSION

The percentage of quality of life of commuter workers using commuter line train and Transjakarta Busway whose workplace is in Jakarta categorized as good is 57.10% and 70%. Environmental and psychological conditions are domains that have the highest score to commuter workers using commuter line train and Transjakarta Busway. From the bivariate analysis, the significant correlation variables to quality of life of commuter line train workers are the income and psychological condition variables, whereas correlation variable the quality of life of Transjakarta Busway workers is type of job variable.

Conflict of Interest: None

Ethical Clearance: The study was approved by the Ethical Committee of Faculty of Public Health, University of Indonesia, Indonesia, the approval number is 296/UN2.F10/PPM.00.02/2018.

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REFERENCES

1. Hansson, E., Mattisson, K., Björk, J., Östergren, P.-O., & Jakobsson, K. Relationship between commuting and health outcomes in a cross-sectional population survey in southern Sweden. BMC Public Health. 2011; 11(1): 834.
2. Kariv, D., & Kirschenbaum, A. Collective Spatial Perceptions of Men and Women Commuters: Linking Space, Jobs and Activity. Journal of Human Ecology. 2007; *22*(1): 71-82.
3. Roberts, J., Hodgson, R., & Dolan, P. "It's driving her mad": Gender differences in the effects of commuting on psychological health. Journal of Health Economics. 2011; 30(5): 1064-1076.
4. Stutzer, A., & Frey, B. S. Stress that doesn't pay:

The commuting paradox. The Scandinavian Journal of Economics. 2008; 110(2): 339-366.

5. Mattisson, K. Commuting, Health, and Wellbeing: Mode and duration matters. 2016.
6. Künn-Nelen, A. Does commuting affect health?. Health economics. 2016; 25(8): 984-1004.
7. Frumkin, H., Frank, L., & Jackson, R. J. Urban sprawl and public health: Designing, planning, and building for healthy communities: Island Press. 2004.
8. Feng, Z., & Boyle, P. Do long journeys to work have adverse effects on mental health?. Environment and behavior. 2014; 46(5): 609-625.
9. Novaco, R. W., & Gonzalez, O. I. Commuting and well-being. Technology and well-being. 2009; 3:174-174.
10. Mahudin, N. D. M., & Mahudin, N. D. M. Transfer effects and permeable boundaries: An empirical study of the effects of commuting stress on employees' work and life. Southeast Asia Psychology Journal. 2012; 1.
11. Gottholmseder, G., Nowotny, K., Pruckner, G. J., & Theurl, E. Stress perception and commuting. Health economics. 2009; 18(5): 559-576.
12. Sandow, E. On the road: Social aspects of commuting long distances to work. Kulturgeografiska institutionen, Umeå universitet. 2009.
13. Mattisson, K., Håkansson, C., & Jakobsson, K. Relationships between commuting and social capital among men and women in southern Sweden. Environment and behavior. 2015; 47(7): 734-753.
14. Knibbs, L. D., Cole-Hunter, T., & Morawska, L. A review of commuter exposure to ultrafine particles and its health effects. Atmospheric Environment. 2011; 45(16): 2611-2622.
15. Zuurbier, M., Hoek, G., Oldenwening, M., Lenters, V., Meliefste, K., van den Hazel, P., & Brunekreef, B. Commuters' exposure to particulate matter air pollution is affected by mode of transport, fuel type, and route. Environmental health perspectives. 2010; 118(6): 783.
16. Han, X., & Naeher, L. P. A review of traffic-related air pollution exposure assessment studies in the developing world. Environment international. 2006; 32(1): 106-120.
17. BPS. Komuter DKI jakarta tahun 2014. 2015.
18. Bowling, A. Measuring disease: a review of disease-specific quality of life measurement scales: Springer. 2001.
19. Susilowati, Indri Hapsari; Fitria, Lassie; Low, Wah Yun; Kaewboonchoo, Orawan; and Ratanasiripong, Paul. Predictive Factors for Quality of Life Among Small and Medium Enterprise Workers in Indonesia. Asian Journal of Applied Science. 2017;10 (3): 116-125. DOI: 10.3923/ajaps.2017.116.125
20. Isahak, M.; Loh, M. Y.; Susilowati, I. H.; Kaewboonchoo, O.; Harncharoen, K.; Mohd Amin, N.; Toai, N.P.; Low, Wah Yun; Ratanasiripong, P. The Association of Workplace Exposures on Quality of Life in Small and Medium Enterprises Workers: A Cross-Sectional Study in Four ASEAN Countries. Asia Pacific Journal of Public Health. 2017; 29 (4):315-327 , DOI: 10.1177/1010539517699060.
21. Dalkey, N. C. A Delphi Study of Factors Affecting the Quality of Life. 2002.

The Effect of Sleep Hygiene and Brain Gym on Increasing Elderly Comfort and Sleep Quality

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ABSTRACT

Introduction: Quality of life is one of the important things to consider, with the increasing number of elderly people, the number of problems and the number of elderly people living in nursing homes also increased. The greatest need for the elderly is the level of health, so that one can live a prosperous life by applying a healthy sleep pattern and carrying out physical exercise. The purpose of this study was to determine the effect of sleep hygiene and brain gym on increasing comfort in the elderly. **Method:** This type of research is a pretest posttest with control group design quasy experiment. The sampling method used was purposive sampling as many as 50 people and had fulfilled the inclusion and exclusion criteria. Sleep hygiene intervention was applied every day for 30 days, and the brain gym was held as many as 16x meetings for 4 weeks. The statistical test used is the independent t-test to test the hypothesis. **Result**: The independent t-test hypothesis test results are 0,000. This study showed significant results on the treatment group, which means that there is an effect of sleep hygiene and brain gym on increasing comfort and sleep quality in the elderly. **Conclusion**: Intervention of sleep hygiene and brain gym can improve comfort and sleep quality in the elderly.

Keyword: *sleep hygiene, brain gym, comfort, sleep quality, elderly*

INTRODUCTION

Aging process is a natural process which is accompanied by a decrease in physical, psychological and social conditions that interact with one another. The greatest need for the elderly is the level of health, in order to live well. Improving the welfare of the elderly is carried out by a series of activities carried out in a coordinated manner between the government and the community to empower the elderly so that the elderly can still carry out their social functions and play an active role naturally in the life of society, nation and state[1].

The central bureau of statistics projects that the elderly population (60+) was expected to increase to 27.1 million by 2020, to 33.7 million in 2025 and 48.2 million in 2035[1]. The results of the 2010 population census show that Indonesia is among the top five countries with the highest number of elderly population in the world, reaching 18.1 million people or 7.6 percent of the total population.

Sleep deprivation in the elderly influences physical, cognitive abilities and quality of life. Elderly people who experience sleep disorders will experience an increase in the amount of sleep during the day, problems with attention and memory, depression, the possibility of falling at night, and low quality of life[23]. During NREM a person experiences 4 stages during the sleep cycle. Stages 1 and 2 are characteristic of superficial sleep and someone is easier to wake up. Stage 3 and 4 are deep sleep and difficult to wake up[4,5].

Kolcaba introduces the theory of convenience as the middle range theory[6]. Kolcaba relates these three types of comfort to four comfort contexts, namely physical, psychospiritual, environmental, and social[7,8]. Fulfillment of basic human functions can be provided with comforting intervention to achieve the comfort needs of recipients of care, including physiological, social, cultural, economic, psychological, spiritual, environmental, and physical interventions[9]. One way of comforting intervention to meet the comfort needs of the elderly from physical and environmental aspects is by applying sleep hygiene and brain gym implementation.

Sleep hygiene is an exercise or habit that can affect sleep[10]. Improving sleep hygiene in the elderly is a simple but effective way to improve sleep quality[11]. Good

sleep hygiene behavior can prevent the development of disturbances and sleep problems[12]. That means good sleep hygiene behavior can help a person to have good sleep quality. Sleep and sleep disturbances during the day indicate that a person has poor sleep hygiene. Poor behavior of sleep hygiene in the elderly for example the elderly often spend more time in bed or intermittently falling asleep during the day more awake at night[13]. Sleep hygiene is applied to the elderly to achieve REM sleep, loss of muscle tension, increased cerebral activity (oxygen consumption, blood flow, neural stimulation), release of epinephrine, and β waves which cause a relaxed or comfortable feeling[14].

Types of physical activity in the elderly include aerobic exercise, muscle strengthening, flexibility, and balance training[15]. Brain gym is an activity that aims to maintain brain health with simple movements[16]. In principle, the basics of brain gym are to train the brain to stay fit and relieve stress[17]. Physical activity that is beneficial for the health of the elderly should meet the FITT criteria (frequency, intensity, time, type). Frequency is how often the activity is carried out, how many days in a week. Intensity is how hard an activity is carried out. Usually classified into low, medium and high intensity. Time refers to the duration, how long an activity is carried out in a meeting, while the type of activity is the types of physical activity carried out[16].

In planning long-term efforts, the government must maintain and improve the quality of life of the elderly[18]. Through brain gym the elderly are trained to be able to bring about a relaxation response so that they can reach a state of calm. This relaxation response occurs through a significant decrease in the body's oxygen requirements, which in turn will flow smoothly, the neurotransmitter will be released, the nervous system will work properly so that the muscles of the body that relax can cause a feeling of calm and comfort. The three types of comfort are: relief which means when the specific comfort needed by the client is fulfilled, ease means when the client feels calm and satisfied, and the latter is transcendence when the client succeeds in exceeding the need for comfort[9].

Sleep quality changes as a function of normal aging, both in terms of decreased duration and consolidation[1920]. The Pittsburgh Sleep Quality Index (PSQI)[21]was originally developed to provide clinicians with a valid, standardized measure of sleep quality that could reliably categorize individuals as either "good" or "poor" sleepers. This 19-item questionnaire assesses sleep quality using subjective ratings for 7 different components (i.e., sleep quality; sleep latency; sleep duration; habitual sleep efficiency; sleep disturbance; use of sleeping medication; and daytime dysfunction). Respondents are asked to answer the questionnaire retrospectively, surveying sleep components spanning the previous month. The PSQI is quick and easy to administer, and score; making it an attractive tool for sleep quality assessments.

METHOD

This research was conducted from August to September 2018 at the social institution in Malang. The study used a quasy pretest posttest with control group group analysis that was intervened according to the planned trial protocol, in the treatment group, whereas in the non-intervention group there was no intervention or intervention other than the one being tested. The implementation of sleep hygiene is applied every day for 30 days and brain gym is done for 4x in a week with a duration of 15-20 minutes and is done for 30 days. The sample of this study amounted to 50 respondents using purposive sampling technique. The statistical test used is the independent t-test to test the hypothesis[22]. The sample in this study was taken according to the criteria of the researchers as many as 50 elderly.

RESULTS

The results of this study were processed using a contingency coefficient correlation test with the help of the Statistical Product and Service Solution (SPSS) program. Based on Table 1 shows that the characteristics of respondents based on age, the most respondents have age 75-90 years (old) as many as 28 respondents (56%). More female sex characteristics than women, as many as 37 respondents (74%). Characteristics of education, the highest number of respondents were high school, namely 18 respondents (36%). The characteristics of the length of stay in the institution of the longest number of respondents is -51-5 years as many as 23 respondents (46%).

Table 1. Characteristics Distribution of the Respondents

Karakteristik f (%)		**Total %**
Age		
	Age 60-70 years old (*elderly)*	22 (44)
	Age 75-90 years old *(old*)	28 (56)
	Age > 90 years old (*very old*)	-
Gender		
	Male	13 (26)
	Female	37 (74)
Education		
	Not completed primary school	8 (16)
	Elementary School	13 (26)
	Junior High School	11 (22)
	Senior High School	18 (36)
period of staying in the elderly nursing house		
	< 1 years	17 (34)
	≥ 1- 5 years	23 (46)
	> 5 years	10 (20)

Based on table 2, the mean of comfort at posttest is 75.90 and the average post test is 7.055. The mean of sleep quality at posttest is 8.35 and the average post test is 2.207. It was seen that there was an increase in the average of comfort and sleep quality before and after being given intervention. To find out whether there is a difference between treatment and control, a paired sample t-test is performed, but normality testing is done first. The results of the Shapiro-Wilk normality test showed that the convenience variable was normally distributed with a significance value of more than 0.05. The results of the independent test t-test after intervention in the treatment and control groups, for comfort variables, β endorphin and sleep quality obtained p <0.05. In the convenience variable p= 0,000 and sleep quality p= 0,000 shows that there is a significant difference in the comfort and quality of sleep between the treatment and control groups after getting an intervention combination of sleep hygiene and brain gym.

Table 2 the Hypothesis Test of the Treatment Group and the Control Group

		Intervention				**Control**					
Group	**N**	$\overline{X}$ **±SD**		**Min**	**Max**	$\overline{X}$ **±SD**		**Min**	**Max**	**Significance**	**Remarks**
Comfort Post	50	75.96	± 6.50	62	87	65.04	± 4.90	55	79	0,000	Significant
Sleep quality post	50	8.44	± 2.00	4	11	5.76	± 1.09	4	8		

Based on table 3 shows the change in the comfort and sleep quality of pre and post test in the treatment and control groups by using paired t-test test obtained p = 0,000 and p = 0.001 which means that there is a significant difference in the level of comfort and quality of sleep between before and after intervention.

Table 3 Paired t-test test results on treatment and control groups

Variabel	N	Sig. (2-tailed)
Comfort Pre test	50	.320
Comfort Post test	50	.000
Sleep quality Pre test	50	.030
Sleep quality Post test	50	.001

DISCUSSION

An experimental study provided interventions in the form of physical activity and the application of good sleep hygiene for the elderly for 16 weeks and the results were significantly improved sleep quality, improved mood and improved quality of life. Factors that influence the quality of sleep in the elderly include illness, psychological stress, medication, nutrition, environment, motivation, lifestyle and exercise (gymnastics)[23]. Efforts to maintain the health of the elderly both in the form of care, treatment, healthy lifestyle, including elderly exercise[24]. Changes in sleep hygiene in a better direction can improve the quality and quantity of sleep[13]. The implementation of sleep hygiene is applied starting to wake up until it will sleep again in accordance with 10 points of sleep hygiene guidelines and applied for 30 days. Scheduling sleep time is written on sleep diary to evaluate the waking time and sleep time of the elderly regularly. In the afternoon around 15.30 a brain gym is held with special movements performed 4x a week. The combination of these two interventions can improve comfort. Mc Cormick asserted that in shaping the comfort of a product or design, attention to human factors plays an important role in creating a design that has good ergonomics, which will create comfort for its users[25].

Better quality of life in elderly people can be achieved by increasing sleep quality as well as promoting good sleep. In order to improve their quality of life and health status, the assessment of sleep characteristics by health-care providers, especially by nurses, is essential and is an important caring activity. Nurses play an important role in recognising the negative effects of sleep disturbances on well-being and the quality of life. In the assessment of the sleep characteristics of the elderly, taking a detailed history, sleep hygiene, sleep patterns, medical diseases, and drugs should all be evaluated[26]. Lack of sleep, sleep problems and the perception of poor health negatively affects the quality of sleep in an old person[27]. As a result of the advancement of age, problems related to sleep increase and adversely affect an individual's perception of poor health and sleep[26].

Quality of life is the extent to which a person can feel and enjoy the occurrence of all important events in his life so that his life becomes prosperous[28]. If a person can achieve a high quality of life, then the life of the individual leads to a state of well-being, on the contrary if someone achieves a low quality of life, then the life of the individual leads to an ill-being[29]. The regularity of the implementation of sleep hygiene combined with the implementation of brain gym for 15-20 minutes is a good combination for the elderly to achieve optimal quality of life. The combination of sleep hygiene with brain gym includes physical, psychological, social and environmental aspects in accordance with WHOQOL.

CONCLUSION

The provision of sleep hygiene, sleep hygiene and brain gym interventions and combinations (sleep hygiene and brain gym) showed significant differences in comfort and sleep quality in the elderly.

Conflict of Interest: None

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REFERENCES

1. Kementerian Kesehatan RI. Peraturan Menteri Kesehatan Republik Indonesia Nomor 25 Tahun 2016 tentang Rencana Aksi Nasional Kesehatan Lanjut Usia Tahun 2016-2019. Jakarta Kementeri Kesehat RI. 2016;
2. Marasinghe C. Sleep disorders in elderly. J Ceylon Coll Physicians. 2014;43(1–2).

3. Crowley K. Sleep and sleep disorders in older adults. Neuropsychol Rev. 2011;21(1):41–53.

4. Kitamura T, Miyazaki S, Kadotani H, Kanemura T, Sulaiman H Bin, Takeuchi S, et al. Non-REM sleep-disordered breathing affects performance on the psychomotor vigilance task. Sleep Breath. 2018;22(2):329–35.

5. Potter PA, Perry AG. Buku ajar fundamental keperawatan: konsep, proses, dan praktik. Jakarta Egc. 2005;1.

6. Kolcaba K, DiMarco MA. Comfort Theory and its application to pediatric nursing. Pediatr Nurs. 2005;31(3).

7. Sitzman KL, Eichelberger LW. Understanding the work of nurse theorists (Vol. 2). Sudbury, MA: Jones and Bartlett; 2011.

8. Apóstolo JLA, Kolcaba K. The effects of guided imagery on comfort, depression, anxiety, and stress of psychiatric inpatients with depressive disorders. Arch Psychiatr Nurs. 2009;23(6):403–11.

9. Alligood MR. Nursing Theorists and Their Work-E-Book. Elsevier Health Sciences; 2017.

10. Landry GJ, Best JR, Liu-Ambrose T. Measuring sleep quality in older adults: a comparison using subjective and objective methods. Front Aging Neurosci. 2015;7:166.

11. Prastyo IA, Sugiyanto EP. EFEKTIVITAS SLEEP HYGIENE DAN GUIDED IMAGERY TERHADAP TINGKAT INSOMNIA PADA LANSIA DI PANTI WERDA PELKRIS PENGAYOMAN SEMARANG. Karya Ilm S 1 Ilmu Keperawatan. 2017;

12. Dewald-Kaufmann JF, Oort FJ, Meijer AM. The effects of sleep extension and sleep hygiene advice on sleep and depressive symptoms in adolescents: a randomized controlled trial. J Child Psychol Psychiatry. 2014;55(3):273–83.

13. Nishinoue N, Takano T, Kaku A, Eto R, Kato N, Ono Y, et al. Effects of sleep hygiene education and behavioral therapy on sleep quality of white-collar workers: a randomized controlled trial. Ind Health. 2012;50(2):123–31.

14. Kaku A, Nishinoue N, Takano T, Eto R, Kato N, Ono Y, et al. Randomized controlled trial on the effects of a combined sleep hygiene education and behavioral approach program on sleep quality in workers with insomnia. Ind Health. 2012;50(1):52–9.

15. Colcombe SJ, Erickson KI, Scalf PE, Kim JS, Prakash R, McAuley E, et al. Aerobic exercise training increases brain volume in aging humans. Journals Gerontol Ser A Biol Sci Med Sci. 2006;61(11):1166–70.

16. Dennison PE, Dennison GE. Buku panduan lengkap brain gym-senam Otak. Jakarta: Grasindo. 2006;

17. Hyatt KJ. Brain gym®: building stronger brains or wishful thinking? Remedial Spec Educ. 2007;28(2):117–24.

18. Koolhaas CM, Dhana K, Van Rooij FJA, Schoufour JD, Hofman A, Franco OH. Physical activity types and health-related quality of life among middle-aged and elderly adults: the Rotterdam study. J Nutr Health Aging. 2018;22(2):246–53.

19. Dehghankar L, Ghorbani A, Yekefallah L, Hajkarimbaba M, Rostampour A. Association of Sleep Quality with Socio-Demographic Characteristics in Elderly Referred to Health Centers in Qazvin, Iran. Sleep Hypn. 2018;20(3):227–32.

20. Daglar G, Pinar SE, Sabanciogullari S, Kav S. Sleep quality in the elderly either living at home or in a nursing home. Aust J Adv Nursing,. 2014;31(4):6.

21. Li MJ, Kechter A, Olmstead RE, Irwin MR, Black DS. Sleep and mood in older adults: coinciding changes in insomnia and depression symptoms. Int psychogeriatrics. 2018;30(3):431–5.

22. Nursalam M. Metodologi Penelitian Ilmu Keperawatan Edisi ke-4. Jakarta: Penerbit Salemba Medika; 2015.

23. Saryono & Widianti AT. Catatan kuliah kebututuhan dasar manusia. Yogyakarta: Nuka Medika; 2010.

24. Widianti AT, Proverawati A. Senam kesehatan. Yogyakarta Nuha Med. 2010;

25. Horn P. Ergonomics as the Common Denominator and Vital Condition to Achieve Sustainability of Buildings of Different Types on Example of Two Built Projects. In: International Conference on Applied Human Factors and Ergonomics. Springer; 2018. p. 387–99.

26. Kaymak SU, Demir B, Şentürk S, Tatar I, Aldur MM, Uluğ B. Hippocampus, glucocorticoids and neurocognitive functions in patients with first-

episode major depressive disorders. Eur Arch Psychiatry Clin Neurosci. 2010;260(3):217–23.

27. Kaymak SU, Peker S, Cankurtaran EŞ, Soygür AH. Yaşlılarda uyku sorunları. Akad Geriatr. 2010;2:61–70.
28. Rapley M. Quality of life research: A critical introduction. Sage; 2003.
29. Chaturvedi MR. A STUDY TO ASSESS THE QUALITY OF LIFE AMONG ELDERLY RESIDING AT SELECTED OLD AGE HOMES OF PUNJAB. Glob J Res Anal. 2018;7(4).

Analysis of Factors Relating to Practice of Breast Self-Examination (Bse) among Women in Indonesia

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ABSTRACT

Background: Cancer is a global health problem, the mortality rate of breast cancer especially due to not being detected until an advanced stage, because of reluctance for undergoing early detection of breast cancer. Diagnosis of breast cancer at an early stage affords good opportunity for long-term survival. Effort has been made to decrease the number of deaths from breast cancer and the aim of this research for understanding factors related to the practice of breast self-examination (BSE). **Method:** This study was cross-sectional study and respondents in research were women work at Martapura Public Health Centre, with number of respondents being 168. Cluster sampling was used and the independent variables were age, job, education, experience, awareness of breast cancer, acquaintances ever having suffered from breast cancer, knowledge and BSE attitude, whereas the variable dependent in the research is BSE practice. Data were collected using questionnaire to obtain data on demographic, knowledge, attitude and practice. **Results**: Statistical results of the tests showed no significant relationship between age, job, education, experience, awareness of breast cancer, acquaintances ever having suffered from breast cancer and BSE practice; however, there was significant relationship between knowledge ($p = 0.047$), attitude of BSE ($p = 0.004$) and BSE practice. **Conclusion:** Factors that have a relationship with the BSE practice in women are knowledge and attitude toward BSE. Increased knowledge and attitudes are expected to increase one's desire to do beneficial things such as practising BSE on time, in the right direction and in the right position.

Keyword: *demographic characteristics, knowledge, attitude, Breast Self-Examination (BSE) practice*

INTRODUCTION

Breast cancer is a malignant tumour originating from breast cells developing uncontrolled so that it can spread to tissues or organs around the breast or other body parts.[1]. Breast cancer is a major cause of death among all cancers experienced by women in Indonesia. Cancer is one of the major global health problems and there is an increase in breast cancer mortality because of detection at an advanced stage.[2] Late diagnosis of breast cancer is often because of a patient's reluctance to undergo early detection.[3] Breast cancer diagnosis in the early stage affords good opportunity for long-term survival. Efforts to reduce the mortality rate from breast cancer require effective screening.[4]

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An early detection programme makes it possible for early diagnosis more effective intervention and increased possibility of success in dealing with breast cancer. There are three methods of early detection of cancer breast, Breast Self-Examination (BSE), Clinical Breast Exam (CBE) and mammography.[2] BSE is a screening method used for detecting early signs of breast cancer by looking and fingering to find abnormality, lump, and swelling in the breasts. BSE as a method is easy, economical, not invasive, and causes no harm and which allows women to know the shape of the breast and quickly recognise if abnormalities are found on the breast, such as detention time or lump.[5]

The best time to start BSE is when a woman has reached puberty and experience breast development. BSE has a main role in intervention at an early stage of breast cancer, with statistics in America and Indonesia showing that 95% of breast cancer events were found by

sufferers themselves. In fact, 90% of breast cancers were found by women when doing BSE. ACS recommends the practice from the age of 20. Although BSE is a simple, easy and economical screening method, many women do not do BSE or do not use correct BSE practice.[6] Qualitative research has found[7] that fear of finding signs and symptoms of breast cancer, such as a lump in the breast, and fear of being diagnosed with breast cancer is a barrier for women to do BSE or other screening methods. According to Miller (2015)[8] respondents will do health examination if there is push factor such as an intervention.

The Indonesian government announced the Early Cancer Prevention and Detection Movement for Indonesian Women in 2015.[9] Priority of an early detection programme in Indonesia is directed at women aged 30-50 years with a target of 50% women by 2019. The event aims at increasing awareness in the community about controlling risk factors and early cancer detection. This involves a series of activities including promotive, preventive, early detection and follow-up activities.

METHOD

Design

This study used a cross-sectional design.

Instrument

The data were collected using a questionnaire that was tested for validity and reliability. The questionnaire consisted of demographic data including level of education, acquaintances ever having suffered from cancer, age, and experience of obtaining information about breast cancer. The questionnaire was related to knowledge of breast cancer and BSE was developed by the researcher and consisted of 15 questions with two choices of answer, correct and wrong. If respondents answered correct then it was given a value of 2 and if they answered wrong the value was 1. Instrument attitude and also a practice instrument of BSE, that previously in Test validity done by using test Pearson's product Moment by comparing the r count with the r table; the r table in this research is 0.361 (0.05).

Research Respondents

The sample in this research consisted of 168 people utilising cluster sampling, with criteria inclusion: 1) No d nature circumstances, pregnant or breastfeeding; 2) Can read and write; 3) Willing to follow activities from start to finish.

Data Collection

The researcher collected data from the Puskesmas region among women suited to inclusion in the research. The researcher approached respondents based on the data provided by the health centre. Researcher gives sealing about the destination, and continued by asking respondents to sign an informed consent form. Next, respondents were asked to complete the demographic data questionnaire and questionnaire research.

Ethical Clearance

This study has passed the institutional review board from the Faculty of Nursing, Universitas Airlangga, Surabaya, number 622-KEPK.

RESULTS

The majority of respondents were aged 36-45 years with 87 respondents (51.8%). The education level of respondents was mostly high school/equivalent with as many as 71 respondents (42.3%). Most respondents were housewives with as many as 55 respondents (32.7%), and most of the respondents had received information about breast cancer with as many as 92 respondents (54.8%). The majority of respondents said they did not have acquaintances who had had cancer.

Table 1. Demographic data of respondents

Data	N	%
Age		
16-25	14	8.3
26-35	33	19.6
36-45	87	51.8
46-55	22	13.1
56-65	12	7.1
Education		
Elementary school/Sederajat	5	3
Middle School/Sederajat	15	8.9
High School/Sederajat	71	42.3
Diploma	19	11.3
Bachelor	58	34.5
Job		
Government employees	50	29.8

Cont... **Table 1. Demographic data of respondents**

Data	N	%
Housewife	55	32.7
Entrepreneurship	31	18.5
Employee	31	18.5
Freelance worker	1	0.6
Acquaintance ever having cancer		
None	146	86.9
Friend	15	8.9
Sister	2	1.2
Mother	1	0.6
Cousin	1	0.6
Parents' relations	2	1.2
Husband	1	0.6
Experience of getting breast cancer information		
Ever	76	45.2
Never	92	54.8

Table 2. Knowledge, Attitudes and Practice of BSE

Variable	N	%
Knowledge		
Good	35	20.8
Enough	100	59.5
Less	33	19.6
Attitude		
Positive	107	63.7
Negative	61	36.3
Practice		
Good	25	14.9
Enough	123	73.2
Less	20	11.9

Based on Table 2, most respondents had sufficient knowledge about breast cancer and BSE with as many as 100 respondents (59.5%). Most had a positive attitude of 107 prescriptions (63.7%) and most of the respondents in the category had sufficient awareness of the practice of BSE with as many as 123 respondents (73.2%).

Table 3. Relations of demographic data with BSE practice

Variable	BSE practice		
	B	T	P Value
Age	-.480	-.612	0.542
Education	0.243	1.118	0.265
Job	0.611	1.364	0.174
Acquaintance ever having cancer	0.760	1.492	0.138
Experience of getting breast cancer information	0.184	-.203	0.839
Knowledge	0.261	2.003	0.047
Attitude	0.474	2.891	0.004

Table 3 shows that the variables of age, education, occupation, acquaintances who had cancer, the experience of obtaining information of breast cancer and BSE did not have a significant relationship with BSE practices in women. But knowledge and attitude had a significant relationship with the practice of BSE.

DISCUSSION

Knowledge has a relationship with breast self-examination (BSE). The majority of respondents had sufficient knowledge in BSE with a high school education and an age range of 36-45 years. The increase in the mean value of knowledge was marked by an increase in respondents' knowledge of breast cancer, signs and symptoms of breast cancer, and breast cancer risk factors. The mean value of respondents' knowledge increased regarding their breast self- examination (BSE) about the best time to do their breast self-examination (BSE) and their practice of breast self-examination (BSE). The results of this study are in line with research which states that one's knowledge is related to the practice of BSE.[10] Other studies state that knowledge of breast cancer, breast cancer risk factors, and breast cancer mammography examination improves BSE practices in women.[11] The level of knowledge is significantly related to the behaviour of early detection of breast cancer.[12] Wahyu (2009)[13] concluded that there was a significant relationship between knowledge about

breast cancer and the motivation of patients to have an early check-up at the Dr. Oncology Surgery Clinic at Dr. Sutomo Surabaya.

Attitudes have a relationship with breast self-examination (BSE). The majority of respondents had a positive attitude toward BSE with a high school education and an age range of 36-45 years. The factors that determine a person's attitude to the importance of early detection of breast cancer are their attitude and direct experience of the object of attitude.[14] Previous research states that there is a relationship between attitudes toward awareness with conscious behaviour.[15]

Respondents were not aware or did not realise it depends on the stimulus they receive. If the stimulus receives supports, the respondent will realise, but if the stimulus received does not have support, the respondent will not be aware. The stimulus received by the respondent can be in the form of knowledge about awareness, or support from family or friends. Before realising, the respondents also experienced behavioural stages caused by the stimulus. These stages include awareness, interest, evaluation, trial and adaption. Each stage will affect the next stage. If each stage supports the other, then the resulting behaviour will be positive. But if they don't support each other, then the resulting behaviour will be negative.[16] According to Ouyang and Hu[17], change in practice implementation occurs after the respondent acquires increased knowledge and BSE attitude.

CONCLUSIONS

Factors that have a relationship with the practice of BSE in women are knowledge of and attitude to BSE. Increased knowledge and attitudes are expected to increase one's desire to do good things, such as practising BSE on time, in the right direction and in the right position.

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REFERENCES

1. Kementrian Kesehatan RI. Situasi penyakit kanker. Pusat data dan Informasi Kementrian Kesehatan RI. 2015.
2. World Health Organization (WHO). Noncommunicable diseases country profiles 2014. 2014.
3. Kwok C, Ogunsiji O, Lee CF. Validation of the breast cancer screening beliefs questionnaire among African Australian women. BMC Public Health., 2015;16(1):117.
4. Shiryazdi SM, Kholasehzadeh G, Neamatzadeh H, Kargar S. Health beliefs and breast cancer screening behaviors among Iranian female health workers. Asian Pac J Cancer Prev., 2014;15(22): 9817–22.
5. Okolie UV. Breast self examination among female undergraduates in Enugu, Southeast, Nigeria. Int J Nurs Midwifery., 2012; 4(1):1–7.
6. Okolie U. Breast self examination among female undergraduates in Enugu, Southeast, Nigeria. Int J Nurs Midwifery., 2012; 4(1):1–7.
7. Taha H, Al-Qutob R, Nyström L, Wahlström R, Berggren V. "Voices of Fear and Safety" Women's ambivalence towards breast cancer and breast health: a qualitative study from Jordan. BMC Womens Health., 2012;12(1):21.
8. Miller AB, Harirchi I, Lotfi MH, Noori M, Mirzaei M, Jafarizadea M, et al. Yazd breast cancer project profile; a community based trial for the evaluation of self-examination and physical examination of the breast cancer disease. Iran J Med Sci., 2015; 40(6): 531.
9. Kementerian Kesehatan RI. Panduan Program Nasional Gerakan Pencegahan dan Deteksi Dini Kanker Leher Rahim dan Kanker Payudara. Jakarta Direktorat Jenderal Pengendali Penyakit dan Penyehatan Lingkung. 2015.
10. Zeinomar N, Moslehi R. The effectiveness of a community-based breast cancer education intervention in the New York State Capital Region. J Cancer Educ., 2013; 28(3):466–73.
11. Taha H, Nyström L, Al-Qutob R, Berggren V, Esmaily H, Wahlström R. Home visits to improve breast health knowledge and screening practices in a less privileged area in Jordan. BMC Public Health, 2014;14(1): 428.
12. Desanti OI, IM Sunarsih S. Persepsi Wanita Berisiko Kanker Payudara Tentang Pemeriksaan Payudara Sendiri Di Kota Semarang, Jawa Tengah. Ber Kedokt Masy, 2010; 26(3):152.
13. Purwatiningsih W. Hubungan Pengetahuan

tentang Kanker Payudara dengan Motivasi Penderita untuk Memeriksakan Diri secara Dini di Klinik Onkologi RSU dr. Soetomo, Surabaya. Bul Penelit RSUD dr Soetomo. 2009.

14. Sunaryo S, Kes M. Psikologi untuk keperawatan. Jakarta Rajawali Pers. 2004.
15. Farid NDN, Aziz NA, Al-Sadat N, Jamaludin M, Dahlui M. Clinical breast examination as the recommended breast cancer screening modality in a rural community in Malaysia; what are the factors that could enhance its uptake? PLoS One. 2014; 9(9):e106469.
16. Notoatmodjo S. Promosi kesehatan dan ilmu perilaku. Jakarta: Rineka Cipta. 2007; 20.
17. Ouyang Y-Q, Hu X. The effect of breast cancer health education on the knowledge, attitudes, and practice: a community health center catchment area. J Cancer Educ., 2014; 29(2): 375–81.

Mangosteen Rind on Oral Mucositis Caused by Radio and Chemotherapy in Cancer Treatment (In Vivo Study on Rats)

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ABSTRACT

Background: Cancer malignancy is often treated by using medication supplements using radio and chemotherapy. However, these treatments have adverse effects on oral which cause difficulties in talking, eating, and even opening the mouth. Therefore, herbal medicine like mangosteen rind gel may become the alternative therapy for this condition.

Method: This research was quantitative and experimental randomized pre-post test with control group design. Samples were 15 Sprague Dawley female rats divided into three groups where group 1 was applicated with mangosteen rind gel intervention, unit 2 was with standard gel intervention (positive control) and the last group was untreated group (negative control). Effect of the mangosteen rind gel of treatment group and post-test of the control group were performed with the ANOVA test.

Results: The usage of mangosteen rind gel on oral mucositis accelerated the reduction of oral mucositis diameter compared to the standard gel and untreated group. On the 14th day of intervention, the recovery rate of oral mucositis on team 1 reached 99.80%, on unit 2 was 67.70% and only 1.20% in an untreated group. Cell signaling examination showed an average increase of TNF-α from day one until day 14. The lowest difference of TNF-α was group 1 (8.88 pg/mL or 14.50%), then followed by group 2 was 12.71 pg/mL (19.25%), and the highest difference was group 3 (21.43 pg/mL or 32.55%).

Conclusion: Mangosteen rind gel may accelerate healing of oral mucositis caused by radio and chemotherapy in cancer treatment. However, further study is necessary to determine the applicability to human being.

Keywords: *cancer, mangosteen, oral mucositis, rats*

INTRODUCTION

Cancer is a killing illness that causes prime death in over the world. Based on International Agency for Research on Cancer (IARC), there were 8.201.575 cancer death and found 14.067.894 new cancer cases in the world [(1)]. Treatment of cancer is usually followed either by chemotherapy or radiotherapy, but adverse effect of this therapy is oral mucositis inflammation of oral mucosa with ulcer [(2, 3)]. This kind of inflammation will be followed by burning sensation, so the patients causing difficulties in talking, eating and even opening the mouth (3rd grade of cancer therapy). Furthermore, the advance condition (4th grade of cancer therapy) shows that the patients aren't able to consume delicious food [(4, 5)].

Therapy of oral mucositis depends on the symptoms which are usually used to calm down the pain due to the inflammation and cure the oral infections. Topical application is one of therapy used for oral mucositis. Nowadays, the standard gel is mostly used for cancer patients with oral mucositis. Unfortunately, sometimes this gel causes hypersensitivity reaction such as skin eruption, itchiness, edema, etc. The researcher reported among 30 patients with oral and oropharynx lesions treated by standard gel generated 83% with pain

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reduction, 13% with no change condition, 3% with early repairment but then become worse [6]. Besides, the gel is no more effective than therapy with *Sucralfate* and *Mucaine* in relieving the pain associated with radiotherapy including *Oral Mucositis* [7]. Due to this condition, herbal treatment could be an alternative solution.

Mangosteen is Indonesian fruit usually used as traditional medicine to cure a stomachache, chronical ulcer, skin infection. Besides, it also has the effect of analgesic and anti-inflammation [8, 9]. It contains fenol derivative such as xanthones or xanthan-9H-ones [8]. Mangosteen rind safe to be used [10] includes of variation of xanthone: α-, β-, γ-mangosteens. They have the ability as the antioxidant, antitumor, anti-bacterial, anti-virus, anti fungi, anti-allergic and anti-inflammation [11,12,13]. Besides, α-Mangosteen can prevent hypoxia due to Reactive Oxygen Species (ROS) of cancer cell [14]. According to some researchers, the diameter of tumor became decrease, and complete regression happened on rats after treated by high doses of xanthone (3.0 mg per tumor) [15].

The initial study [16] showed that mangosteen rind as anti-inflammation gave an excellent impact for male Wistar rats on the recovery of oral ulcer caused by trauma. During inflammation phase in wound healing process, some cytokines have an essential role especially such as IL-1, IL-1β, IL-6, and TNF-α [17]. This study would like to investigate the ability of mangosteen rind in healing oral mucositis happening during cancer treatment with chemo and radiotherapy.

METHODOLOGY

Material

1. Carcinogenic agent 7,12-dimetilbenz[a] antrasen (DMBA), corn oil, prepared as test compound mixture.

2. Elisa Kit from Biolegend Company.

Method

1. The extract of mangosteen rind (18) :

a. Identification of the type of mangosteen: Garcinia mangostana L.

b. Prime active substance: xanthone and α-mangosteen.

c. Mangosteen rinds were cut, dried in oven 50°C in 72 hours, ground to become powder and stored in air retention bowl.

d. Then the powder of mangosteen rind was extracted by Soxhlet method.

2. The formula of mangosteen rind gel:

a. Mangosteen rind extract and other additional material were mixed homogeneously.

b. Added in sequence: Na Benzoid, Carbopol, HPMC (Hidroksi Propyl Metil Selulosa), TEA (Triethanolamine) and mixture homogenously when attached to each material.

c. Put it in a tube.

3. Cancer induction with 7,12-DMBA (Dimethylbene (a) anthracene) (19):

a. DMBA solution was made by mixing it with corn oil and vortex in 15 minutes.

b. Given doses were 20 mg/kg weight, twice a week in 5 weeks (frequency: 10 times).

c. Injected with the oral cannula through the oesophagus.

d. Observed from the first week after DMBA initiation. Palpation its breast 1-2 times a week till there was a lump.

4. Oral mucositis model:

a. Make a wound on the lower oral labial mucosa.

b. Treated with H2O2 (hydrogen peroxide) 3% using cotton bud in 90 seconds.

c. Observed till there was an ulcer (around 48 hours).

Identification of oral mucositis recovery:

1. Measured the diameter of the wound (mm) every day from the 1st day until the 14th day.

2. Measured TNF α on the 1st and 14th day:

a. Centrifuged 5 ml blood taken from a retro-orbital sinus (20).

b. Elisa (Enzyme-linked immunosorbent assay) kit was used to detect the amount of TNF α in blood serum (pg/mL).

Subjects:

1. Female Sprague Dawley rats :

a. 160-180 g in weight,

b. 5 – 6 weeks old,

c. Healthy condition and never used in research before.

2. Sample

With simple random sampling, 15 rats were divided into three groups:

a. Group 1: the wound was treated with mangosteen rind gel.

b. Group 2: the wound was treated with standard gel (positive control).

c. Group 3: untreated/without treatment (negative control).

Each group consisted of 5 (five) rats and 1 (one) additional rat to anticipate death rat (21). Data were analyzed with repeated ANOVA test and presented in tables and graphics.

RESULTS

Formula of Mangosteen Rind Gel

Table 1. Formula of Mangosteen Rind Gel

Material	Amount
Mangosteen Rind Extract	60% x 20 g = 12 g
HPMC	
TEA	1.1 g
Carbopol	
Na Benzoate	
Aquadest	20 g – (12 g + 1.1 g) = 6,9 g

Diameter of Oral Mucositis Recovery Process

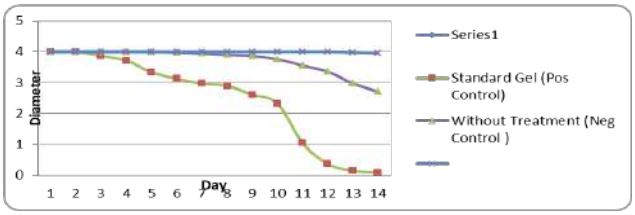


Figure 1. Diameter of Oral Mucositis Recovery Process

Figure 1 showed that diameter of oral mucositis became decreased. On the 14th day, group 1 (treated by mangosteen rind gel) healed (99.8%) with diameter 0.08 ± 0.08 mm. Group 2 (treated by standard gel) only healed 67.7% with diameter 2.71 ± 0.41 mm. Group 3 (untreated) only 1.2% healed with diameter 3.95 ± 0.10 mm.

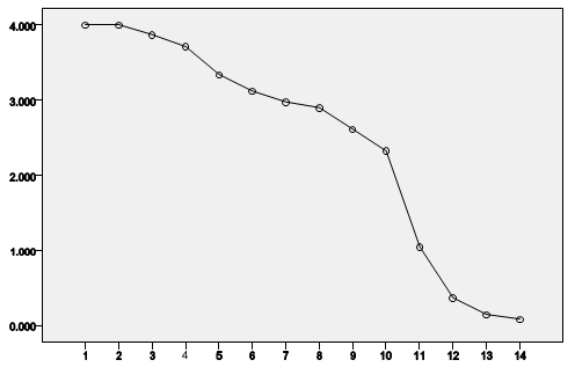
TNF-α

Table 2. Measurement of TNF-α on Oral Mucositis Recovery Process

No.	Intervention	Mean of TNF-α ± SD (pg/mL)		Δ TNF-α	
		Day-1	Day-14	pg/ mL	%
1.	Mangosteen Rind Gel	52.40 ± 13.92	61.29 ± 14.25	8.89	14.50
2.	Standard Gel (Positive Control)	53.34 ± 8.52	66.06 ± 8.85	12.71	19.25
3.	Without Treatment (Negative Control)	44.40 ± 6.48	65.83 ± 22.86	21.43	32.55

Table 2 showed that the amount of TNF-α was increased from day 1 to day 14. The lowest difference in each group was on the team I which was treated by mangosteen rind gel (8.89 pg/mL or 14.50%), followed by group 2 was 12.71 pg/mL (19.25%) and the highest difference was group 3 (21.43 pg/mL or 32.55%).

Inferential Analysis:



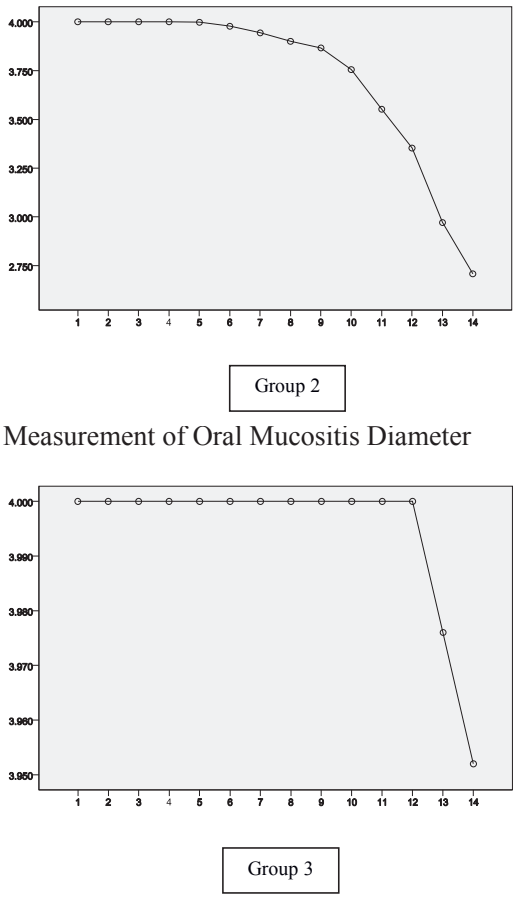


Figure 2. Measurement of Oral Mucositis Diameter Treated by Mangosteen Rind Gel (Group 1), Standard Gel (Group 2) and Untreated Group (Group 3)

There were significant differences analyzed by ANOVA test. ($p_{value} < 0{,}001$). The wound healing process on group 1 happened on day 2 and day five on group 2, but no healing process happened until day 12 in group 3.

Measurement of Oral Mucositis Diameter among Groups

Table 3. Differential Test of Oral Mucositis Diameter Inter Groups

Pairwise Comparison		p value
Group 1*)	Group 2	.000
	Group 3	.000
Group 2*)	Group 1	.000
	Group 3	.001
Group 3*)	Group 1	.000
	Group 2	.001

*) Group 1: treated by mangosteen rind gel; Group 2: treated by standard gel ; Group 3: without treatment

Table 3 showed there was significant difference on measurement of oral mucositis diameter ($p_{value} \leq 0{,}001$) in inter groups.

DISCUSSION

This study used mangosteen Garcinia mangostana which contains xanthone dan α mangosteen [18]. Mangosteen rind gel (20 g) only comprised 60% (12 g) of its active substance due to the research that mangosteen rind extract with concentration more than 40% could inhibit the bacteria growth [16]. The result showed that the decrease in the size of diameter oral mucositis treated by mangosteen rind gel was faster than others. Wound healing process happened on the 2nd day while others were on the 5th day (positive control group) and 12th day (untreated group). On the 14th day, wound healing process was almost complete (99.8%) with the diameter 0.08 ± 0.08 mm. Meanwhile, the healing process on the group treated by standard gel was only 67.7% with diameter 2.71 ± 0.41 mm and just 1.2% with diameter 3.95 ± 0.10 mm on the untreated group. Wound healing process would be optimal if the material contained with subsequences that could protect the cells from bacteria infection, decreased inflammation process and induced cell proliferation to reconstruct the broken cells [22]. Besides, antioxidant subsequences could help in reducing inflammation process [23].

Xanthone has biochemistry effects such as antioxidant, anti-bacterial, anti-inflammation so it could be used to treat wounds. Some researchers had proved the role of xanthone in wound healing, tumor or carcinogenic activities [24]. Another research had shown that extract of mangosteen rind had the ability as oral anti-bacteria to inhibit the growth of Streptococcus pyogenes, Streptococcus mutans, Staphylococcus aureus, and Porphyromonas gingivalis [13,25]. Xanthone had also effect on the maturation of collagen, it was primary protein (70-80%) in the extracellular matrix that had an essential role in wound healing process [26]. This healing process consists of 4 (four) phases hemostatic, inflammation, cell proliferation and maturation. It's started with the formation of fibrin and infiltration of the neutrophil. This process happened precisely and orderly. The interruption occurred in the process would cause chronical wound and prolong the recovery time [27].

The result showed that there was an increase of TNF-α from day one until day 14 in wound healing process of oral mucositis. The lowest difference of TNF-α was on group 1 with mangosteen rind gel (14.50%), then followed by group 2 with standard gel (19.25%) and the highest difference was on team 3 (32.55%). TNF-α was released by neutrophil and macrophage cells. This TNF-α had roles in inflammation and reepithelialization process, and it would increase on the acute and chronical wound [17]. It was produced at the beginning of healing process, and its concentration was essential to the result of wound healing. When its concentration was low, it could support indirectly on inflammation process and increase growth factors which produced macrophage cell. On the other side, the higher the level of its concentration, it could depress synthesis or matrix cellular protein (ECM), promoted the production of natural tissue inhibitors (TIMPs) and increased matrix metalloproiteinases (MMPs) [28]. So the process of wound healing might be delayed.

CONCLUSION

There was an effect of mangosteen rind gel on wound healing process of oral mucositis due to cancer therapy – chemotherapy and radiotherapy. It could accelerate the healing of oral mucositis within 14 days. Amount of mangosteen rind extract 60% on gel formula could heal this oral mucositis.

Measurement of oral mucositis diameter on the 14th day, group 1 (mangosteen rind gel intervention) healed 99.80% with diameter 0.08 $\pm$ 0.08 mm, group 2 (standard gel intervention) only healed 67.70% with diameter 2.71 $\pm$ 0.41 mm and group 3 (without intervention) only 1.20% healed with diameter 3.95 $\pm$ 0.10 mm.

There was an increase of TNF-α from day one until day 14 in wound healing process of oral mucositis. The lowest difference of TNF-α was on group 1 treated by mangosteen rind gel was 8.89 pg/mL; 14.50%, on group 2 treated by standard gel was 12.71 pg/mL; 19.25% and on unit 3 without intervention was 21,43 pg/mL; 32,55%.

Conflict of Interest: The authors have no conflict of interests related to the conduct and reporting of this research.

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Ethical Clearance: Before conducting the study, written permission was obtained from Politeknik Kesehatan Kementrian Kesehatan Semarang, Indonesia.

REFERENCES

1. Kemenkes RI. Situasi Penyakit Kanker. Pusat Data dan Informasi. 2015
2. Mañas A, Palacios A, Contreras J, Sánchez-Magro I, Blanco P, Fernández-Pérez C. Incidence of oral mucositis, its treatment and pain management in patients receiving cancer treatment at Radiation Oncology Departments in Spanish hospitals (MUCODOL Study). Clinical and Translational Oncology. 2009;11(10):669-76.
3. Worthington HV, Clarkson JE, Bryan G, Furness S, Glenny A-M, Littlewood A, et al. Interventions for preventing oral mucositis for patients with cancer receiving treatment. Cochrane Database Syst Rev. 2010;4.
4. Al-Dasooqi N, Sonis ST, Bowen JM, Bateman E, Blijlevens N, Gibson RJ, et al. Emerging evidence on the pathobiology of mucositis. Supportive care in cancer. 2013;21(7):2075-83.
5. Bennett M. Pain management for chemotherapy-induced oral mucositis. Nursing children and young people. 2016;28(10):25-9.
6. De Cordi M, D'andrea P, Giorgiutti E, Martina S, editors. Gelclair, potentially efficacious treatment for chemotherapy-induced mucositis. Italian tumor league III congress for professional oncology nurses, Conegliano; 2001.
7. Barber C, Powell R, Ellis A, Hewett J. Comparing pain control and ability to eat and drink with standard therapy vs. Gelclair: a preliminary, double center, randomised controlled trial on patients with radiotherapy-induced oral mucositis. Supportive care in cancer. 2007;15(4):427-40.
8. Cui J, Hu W, Cai Z, Liu Y, Li S, Tao W, et al. New medicinal properties of mangosteens: Analgesic activity and pharmacological characterization of active ingredients from the fruit hull of Garcinia mangostana L. Pharmacology Biochemistry and Behavior. 2010;95(2):166-72.
9. Obolskiy D, Pischel I, Siriwatanametanon N, Heinrich M. Garcinia mangostana L.: a

phytochemical and pharmacological review. Phytotherapy research. 2009;23 (8):1047-65.

10. Sunarjo L, Oedijani, Suharti, Susanto HS. The Preliminary Study on Safety of Using Mangosteen Peel Extract as Natural Herbs. Journal of Medical Science And Clinical Research. 2017;05(07): 24851-6.
11. Pedraza-Chaverri J, Cárdenas-Rodríguez N, Orozco-Ibarra M, Pérez-Rojas JM. Medicinal properties of mangosteen (Garcinia mangostana). Food and Chemical Toxicology. 2008;46 (10):3227-39.
12. Shan T, Ma Q, Guo K, Liu J, Li W, Wang F, et al. Xanthones from mangosteen extracts as natural chemopreventive agents: potential anticancer drugs. Current molecular medicine. 2011;11 (8):666.
13. Tadtong S, Viriyaroj A, Vorarat S, Nimkulrat S, Suksamrarn S. Antityrosinase and antibacterial activities of mangosteen pericarp extract. J Health Res. 2009;23 (2):99-102.
14. Lei J, Huo X, Duan W, Xu Q, Li R, Ma J, et al. α-Mangostin inhibits hypoxia-driven ROS-induced PSC activation and pancreatic cancer cell invasion. Cancer letters. 2014;347 (1):129-38.
15. Watanapokasin R, Jarinthanan F, Jerusalmi A, Suksamrarn S, Nakamura Y, Sukseree S, et al. Potential of xanthones from tropical fruit mangosteen as anti-cancer agents: caspase-dependent apoptosis induction in vitro and in mice. Applied biochemistry and biotechnology. 2010;162 (4):1080-94.
16. Sunarjo L, Hendari R, Sulistijarso N. Kulit Buah Manggis terhadap Kesembuhan Trauma Mekanik pada Rongga Mulut. Jurnal Riset Kesehatan. 2014;3 (3):615-21.
17. Sinno H, Prakash S. Complements, and the wound healing cascade: an updated review. Plastic surgery international. 2013.
18. Pothitirat W, Gritsanapan W. HPLC quantitative analysis method for the determination of α-mangosteen in mangosteen fruit rind extract. Thai Journal of Agricultural Science. 2009;42 (1):7-12.
19. Miyata M, Furukawa M, Takahashi K, Gonzalez FJ, Yamazoe Y. Mechanism of 7, 12-dimethylbenz [a] anthracene-induced immunotoxicity: the role of metabolic activation at the target organ. The Japanese Journal of Pharmacology. 2001;86(3): 302-9.
20. Joslin JO. Blood collection techniques in exotic small mammals. Journal of Exotic Pet Medicine. 2009;18 (2):117-39.
21. Charan J, Kantharia N. How to calculate sample size in animal studies? Journal of pharmacology & pharmacotherapeutics. 2013;4(4):303.
22. Kulac M, Aktas C, Tulubas F, Uygur R, Kanter M, Erboga M, et al. The effects of topical treatment with curcumin on burn wound healing in rats. Journal of molecular histology. 2013;44 (1):83-90.
23. Mohanty C, Das M, Sahoo SK. Sustained wound healing activity of curcumin loaded oleic acid-based polymeric bandage in a rat model. Molecular Pharmaceutics. 2012;9 (10):2801-11.
24. Lee YB, Ko KC, Shi MD, Liao YC, Chiang TA, Wu PF, et al. α-Mangostin, A Novel Dietary Xanthone, Suppresses TPA-Mediated MMP-2 and MMP-9 Expressions through the ERK Signaling Pathway in MCF-7 Human Breast Adenocarcinoma Cells. Journal of food science. 2010;75 (1):13-23.
25. Li Q, Xu J-G. Effects of Extraction Solvents on Phytochemicals and Antibacterial Activities of Garcinia mangostana Pericarp. Asian Journal of Agricultural and Food Sciences. 2014;2 (4):289-95.
26. Shoulders MD, Raines RT. Collagen structure and stability. Annual review of biochemistry. 2009;78:929-58.
27. Guo S, DiPietro LA. Factors affecting wound healing. Journal of dental research. 2010;89 (3):219-29.
28. Barrientos S, Stojadinovic O, Golinko MS, Brem H, Tomic-Canic M. Growth factors and cytokines in wound healing. Wound Repair and Regeneration. 2008;16 (5):585-601.

Factors Related to Personal Absorbed Dose in Health Workers at Hospital's Radiology Unit

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ABSTRACT

Diagnostic radiology services are an integral part of medical services that need special attention because they are useful in diagnosing, but also very dangerous for patients, officers and the environment. The purpose of this study was to analyze factors related to the personal absorbed dose of health workers

This study was an observational study with cross sectional approach. This study conducted at private hospitals in Surabaya (Hospital A, B and C) and the population was 36 workers. Dependent variable in this study was personal absorbed dose while independent variable was gender, knowledge, attitude, age, education, study program, length of working, type of work, obedience in using personal protective equipment, presence of workers when rest time, average of treated patient by workers, dose limitation, x-ray, facility building, record and report, policy, and supervision.

Result of linear regression test showed that there is five variable that its standardization coefficients are related to personal absorbed dose, such as length of work, age, policy and obedience in using radiation Personal Protective Equipment (PPE) completely (β 0,206, β 0,579, β - 0,716, β -0, 161 respecively)

It is recommended for hospitals to make a supportive policy to reduce dose of exposure to health workers. It is necessary to supervise the completeness of using radiation Personal Protective Equipment (PPE).

Keywords: *Health Workers, Radiation, Personal Absorbed Dose, Policy*

INTRODUCTION

Hospital is a workplace that has many risk factors such as physical, biological, ergonomic, psychological and chemical. Potential hazards in hospitals due to physical, biological, chemical, ergonomic, and psychosocial factors can cause illness and accidents for workers, patients, visitors and communities arround. Hospital workers have a higher risk than other workers for work-related disease and work-related accident[1]

The radiology installation, which is part of the hospital, as a medical supporter, use ionizing radiation sources to diagnose the presence of a disease in the form of anatomical features displayed in radiographic films. The negative effects of exposure to X-ray radiation in the human body can be acute and chronic effects, acute effects can usually be seen immediately after exposure, whereas chronic exposure begins to develop if accumulated several years after exposure. The effects of radiation can affect almost all parts of the human body, ranging from the skin, eyes, thyroid, lung, reproductive organs, blood clotting system, digestive system and fetus

According to the Department of Manpower in Indonesia, in 2011 there were about 61 cases of accidents caused by radiation exposure. Research at company X Surabaya, as many as 7 people (46,7%) from 15 respondent radiographer, leukocyte count is not normal and this can be caused by X-ray exposure and radiographer condition itself [2].

A preliminary study at the radiology unit of RS A Surabaya and an interview with the head of the Radiological Unit showed that the implementation of radiation safety has not gone well. There is still

no medical physician officer, measuring instrument of radiation dosage of TLD badge is only given to radiographer who have permanent employees status, medical check up is done every 2 years, and facilities of radiology room is not enough. In addition, radiation accidents have occurred in workers. Measurement results in May 2016 show that 50% of health workers have a personal absorption dose exceeding the Dose Limit Score set by the Nuclear Power Control Agency 20 mSv / year.

Based on the background above, the purpose of this study was to analyze factors related to the personal absorbed dose of health workers at Hospital A, Hospital B and Hospital C in Surabaya. RS A, RS B and RS C in Surabaya.

MATERIAL AND METHOD

This study was an observational study with cross sectional approach. This study conducted at private hospitals in Surabaya (Hospital A, B and C) and the population was 36 workers. The data were collected by questionnaire, observation and interview. The data analysis is done by linear regression test to see how big the relation of independent variable to dependent variable.

FINDINGS

Characteristics of Health Workers

Based on table 1, it showed that mostly man are at Hospital C with percentage (50%) as many as 8 respondents while woman are more dominant in Hospital B with 60% percentage as many as 9 respondents. The average age of Hospital B employee is relatively young which is 28 years old while Hospital C 48 years old. The length of work in each hospital an average of 7 hours per day. The highest education level of respondent is D3 (93,3%) at Hospital B and dominant of Radiology Study Program (100%) while in Hospital C there are 31,3% health workers that have equal education of SMU and not radiology program. Radiology health workers in Hospital B mostly have radiation protection training (86,7%), while Hospital C only 56,3%.

Table 1. Characteristics of Responden at Hospital A, Hospital B and Hospital C

Variable	Hospital A		Hospital B		Hospital C	
	N	%	N	%	N	%
Gender						
Man	4	80	6	40	8	50
Woman	1	20	9	60	8	50
Age (X± SD	5	39±14	15	28±9	16	48±9
Length of Work (hour/da	5	6±2	15	7,5±0,2	16	7±1
Type of Work						
Doctor (S2)	1	20,0	1	6,7	4	25,0
Radiographer(D3)	4	80,0	14	93,3	7	43,8
Asistant (SMU)					5	31,3
Study Program						
Radiology	5	100	15	100	11	68,8
Non Radiology					5	31,3
Radiation Protection Training						
Ever	4	80,0	13	86,7	9	56,3
Never	1	20,0	2	13,3	7	43,8
Knowledge about Radiation Safety						
Good	4	80	8	53,5	12	75,0
Fair	1	20	7	46,7	4	25,0
Attitude to Occupational Health and Safety						
Good	3	60	14	93,3	12	75,0
Fair	2	40	1	6,7	4	25,0

Cont... **Table 1. Characteristics of Responden at Hospital A, Hospital B and Hospital C**

Obedience in using PPE completely						
Good	2	40	4	26,7	10	62,5
Fair	3	60	11	73,3	6	37,5
Presence of workers when rest time						
In the Room	4	80	11	73,3	13	81,3
Outside the Room	1	20	4	26,7	3	18,7
Average of treated patient by workers	5	10±2,6	15	10,8±2,6	16	9,8±1,7

Hospital C have 12 responden that have good knowledge about radiation safety (75%). Hospital B have 14 responden that have a good attitude of occupational health and safety (93,3%). Obedience in using PPE completely with good category (62,5%) is at Hospital C while in Hospital B is fair (73,3%). When the health workers are at rest, they dominantly rest in the room (81,3%) at Hospital C and 26,7% of health workers at Hospital B are outside the room. Approximately, health workers treat 11 patient a day.

Tabel 2. Result of Multiple Linear Regression of Independent variable to Dependent Variable at Hospital A, Hospital B, and Hospital C

Variable	**Standarized Coefficients Beta**	**Sig**
Length of work	0,206	0,343
Age	0,579	0.058
Presence of workers when rest time	0,103	0,69
Dose Limitation	0,066	0,812
Policy	-0,716	0,001
Training	-0,102	0,505
Obedience in using PPE completely	-0,161	0,555
Average of treated patient by workers	0,127	0,468
Attitude to Occupational Health and Safety	-0,021	0,902
Knowledge about Radiation Safety	0,158	0,436
Gender	-0,013	0,941
Constant : 0,950		
R Square : 0,574		
Anova : 0,013		

Notes: Education and Study Program have multicolinearity, X-ray, facility building and gender are excluded variable.

Based on table 2, independent variable such as length of work, age, training, presence of workers when rest time, obedience in using PPE completely, average of treated patient by workers, knowledge, attitude, type of work, gender, policy ang dose limitation have effect on personal absorbed dose simultaneously. It can be seen on *Pvalue Anova* 0,013>α=0,05.

a) Relation of gender with personal absorbed dose

Gender is the difference between men and women biologically from birth. The difference between men and

women is not only biologically but also physically and psychologically.

The value of man regression coefficient equal to -0.013. It can be interpreted that man regression variable has a negative effect on the absorption of radiation. This shows that the man regression will increase by 1 unit, the absorption of radiation will decrease by 0,013.

The effects of radiation on men and women are almost the same. Every body tissue also has its own sensitivity to radiation (organ weight factor), for example, the sex cells have higher organ-weight factors than bone marrow, kidney, lung, and others. But for women, the effect is increasingly complex. Not only damage the cells and tissues but also the fetus (if in a condition of pregnancy). In addition to pregnancy, according to BATAN female workers in the breastfeeding period are not allowed to work in radiation areas with high risk of contamination[3]

b) Relation of age with personal absorbed dose

The results showed that age had positive effect on the absorption dose of radiation that is 0,579. The higher the age, the absorbed dose of radiation will increase by 0.579.

Based on the results of the study, workers over the age of 40 years are radiology specialists and radiographers who have had a long working period, experienced in the field both in the field of diagnostic and interventional radiology and more interventional action. Radiation received by interventional radiologists has a potentially high risk of radiation and may exceed the[4]

c) Relation of length of work with personal absorbed dose

The result of analysis showed that the duration of work had positive effect on the absorption dose of radiation equal to 0,206. When the duration of work increases by 1 unit, the absorption dose of radiation will increase also by 0.206.

The longer the working hours, meaning the more the number of patients performed radiological examiner and many complex procedures / actions performed per day for example the action of fluoroscopy where the radiation beam emitted directly and continuously with the duration of the old work the exposure to radiation received greater

d) Relation of Presence of workers when rest time with personal absorbed dose

The result of the analysis showed that rest in the room had positive effect on the absorption dose of radiation that is 0,103. In indoor workers, radiation absorption doses will increase by 0.103.

Most health workers resting indoors feel secure because there is a Pb shield on the wall of the X-ray room with a room directly adjacent to the workspace. The radiology unit served 24 hours, when an officer rested, the other officers were still working

When resting, it should be outside the radiation area, to avoid possible exposure to radiation scattering radiation rays.

e) Relation of dose limitation with personal absorbed dose

The results showed that the dose limitation had positive effect on the absorption dose of radiation that is 0,066. When the dose limitation is increased by 1 unit, the absorption dose of radiation will also increase by 0.066 or vice versa.

If the dose limitation aspect in the form of providing radiation protection equipment should be able to reduce the absorbent dose of health workers, but the fact that there are non-adherent health workers use PPE radiation completely so that the acceptable personal absorption dosage increases. One of the main factors to minimize exposure is adequate protection equipment and proper use in the procedure / action space

f) Relation of policy with personal absorbed dose

The results of the analysis showed that the policy had a negative effect on the absorbed dose of radiation -0.716. When the policy increases by 1 unit, the absorbed dose of radiation will decrease by 0.716, or vice versa.

If the policy related to service standards in the radiology unit is well implemented and there is supervision from risk management of radiation exposure may decrease. Management must strive to reduce and control hazards and risks, prevent accidents and injuries, and maintain safe conditions [5]

g) Relation of radiation protection training with personal absorbed dose

The results showed that the training had a negative effect on the absorption dose of radiation that is 0.102. As the training increases by 1 unit, the absorption of radiation will decrease by 0.102.

Training is an activity designed to help increase the access of workers to gain or increase the knowledge, skills, attitudes and behaviors required to perform the job well [6] Most health workers have attended radiation protection training, with training, they gain knowledge on how to prevent and minimize exposure to radiation in the body

h) Relation of Obedience in using PPE completely with personal absorbed dose

In conducting the activities of radiation workers are sometimes required to use personal protective equipment, because exposure to radiation generated X-ray plane is high enough. For this purpose, the radiology unit is obliged to provide complete personal protective equipment for its workers, as a means of minimizing the impact and effects of radiation received by workers.

The result of the analysis showed that PPE compliance had negative effect on the absorption dose of radiation that is 0,161. When PPE compliance increases by 1 unit, the absorption of radiation decreases by 0.161.

Compliance with nest in the use of radiation APD completely can reduce radiation exposure so as to avoid the health hazards of both stochastic, non stochastic and nasokimia infections in carrying out their duties. There are abnormalities experienced by 4 respondents who, due to not wear Personal Protective Equipment (PPE). The abnormality is characterized by reduced levels of leukocytes (white blood cells), which serves to defend the body from disease. This is in accordance with the results of research indicating that adherence to the use of PPE affect the absorption of radiation

i) Relation of Average of treated patient by workers with personal absorbed dose

The results showed that the number of patients per day had a positive effect on the absorption of radiation dose of 0.127. The more the number of patients per day treated, the absorbent dose of radiation will increase by 0.127.

The more patients treated, the more likely it is to get radiation exposure and increase the personal dose. This is because Radiation received by radiation workers is mostly radiation scattering from patients.

The level of radiation exposure around the patient can be higher in normal working conditions. If protective devices and radiation measurements are not used and if many complex procedures / actions are performed per day, there is a possibility of interference. In many cases, the relationship between the dose of the worker and the patient is largely dependent on the equipment, the doctors/interventional procedures.

j) Relation of attitude with personal absorbed dose

The result of the analysis shows that the negative effect on absorption of radiation is -0,021. When the attitude increases by 1 unit, the absorption of radiation will decrease by 0.021.

Attitude is a state of being affected by a person, an idea, or an object. Attitude can indicate a person's readiness to behave. The highest level of attitude is when a person is responsible for the risks to be faced due to his choice of a problem[7]

Health workers who have a positive attitude to work safely can reduce the risk of radiation because nakes work with caution and use the radiation APD to minimize the absorbed dose of radiation received.

k) Relation of knowledge with Personal Absorbed Dose

Workers with good practice categories are widely owned by workers with a good level of knowledge[8]. Knowledge related to occupational safety and health in this case radiation safety need to be explored, maintained and developed and well utilized to improve the competence and safety of the officer. This is because knowledge is one of the internal factors that can affect one's behavior [9]

The result of the analysis showed that the knowledge had positive effect on the absorption dose of radiation that is 0,158. When knowledge increases by 1 unit, the absorption dose of radiation will also increase by 0.158, or vice versa.

This happens because the well-informed workers are able to perform various work-related actions in

the radiation field, such as: guiding the percutaneous procedure in the operating room, performing fluoroscopy, despite full radiation APD to minimize exposure dose, the job has a high radiation risk because the radiation beam is continuous and in the long duration until the surgical / surgical action is completed.

CONCLUSION

It can be concluded that there are five variables of standardization coefficient related to the personal absorption dosage that is the variable of work, age, policy and compliance of Personal Protective Equipment (PPE).

Conflict of Interest: None

Source of Funding : None

Ethical Clearance: The study was approved by the ethical committee of Universitas Airlangga. All subjects were fully informed about the procedures and objectives of this study and each subject prior to the study signed an informed consent form.

REFERENCES

1. Decree of the Minister of Health of the Republic of Indonesia No. 1087 / MENKES / SK / VIII / 2010 concerning Occupational Health and Safety Standards at the Hospita
2. Hidayati, L. (2012). Overview Compute Leucocytes on Radiographers at Company X Surabaya Year 2012
3. Mayerni, Ahmad, A., Abidin, Z. (2013). The Impact of Radiation on the Health of Radiation Workers at Arifin Achmad Hospital, Santa Maria Hospital and Awal Bros Pekan Baru Hospital, Journal of Environmental Science, Environmental Science Program of PPS Universitas Riau, pp. 114-127
4. Murniaty, E., Rusmanto, E. Yuliati. (2006). Radiation Risk Potential Study In Interventional Radiological Facilities. Nuclear Safety Seminar 2 - 3 August 2006
5. KARS, (2013). Guidelines for the Conduct of Hospital Accreditation Survey. Jakarta: Hospital Accreditation Committee. P. 6-21.
6. Iqbal, M. (2014), Description of Factors of Use of Personal Protective Equipment at Workers at Metalforming Department at PT. Dirgantara Indonesia Year 2014. Thesis. Jakarta; Syarif Hidayatullah State Islamic University
7. Notoatmodjo, (2007). Public Health Sciences and Art. Jakarta: Rineka Cipta
8. Kurniawan, B., D. Lestyanto, D. Murtiningtyas. (2006). Relationship of Worker Characteristics with the Practice of Application of Safety Procedure at PT. Bina Buna Kimia Ungaran. Journal of Health Promotion Indonesia Vol 1 / No. 2 / August 2006
9. Notoatmodjo, (2010). Health promotion: theory and application. Jakarta: Rineka Cipta.

Analysis of Factors Related to Communication Skills in Midwifery Students

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ABSTRACT

Introduction: Skills to practice and communication skills is important for midwifery students, The importance of soft skills will later be used when students are in the world of work. This study aims to determine what factors are correlated with the communication skills of midwifery students. **Method:** The research design is cross-sectional using a simple random sample. The number of respondents was 38 students. The dependent variable in this study is communication skills. The independent variables are motivation, self-leadership strategies, job satisfaction, self-efficacy, psychological empowerment, task commitment, and communication skills. The analysis used is a statistical test Spearman Rho correlation with p=0.05. **Results:** The results showed that motivation has a correlation with communication skills (p=0.00), job satisfaction has a correlation with communication skills (p=0.00) and task commitment has a correlation with communication skills (p = 0.00). At the same time, self-leadership strategy, self-efficacy, psychological empowerment and communication skills do not have a correlation with communication skills (absolute). **Conclusion:** Factors related to communication skills are motivation, job satisfaction, and task commitment.

Keywords: *Communication skills, soft skills, education, motivation*

INTRODUCTION

Education is a major factor in the formation of human persons. Education plays a role in shaping the good and bad in human beings according to normative measures.[1] Recognising the importance of this, the government has paid serious attention to dealing with the education sector, because it is hoped that a good education system will give birth to the nation's next generation of qualified individuals able to adapt to the life of the society, nation, and state (Republic of Indonesia's Law no 20 in 2001). Surveys from the National Association of College and Employee USA 2002), to 457 leaders in America, about the 20 most important qualities of successful people, the results show successive soft skills and only two hard skills.[2] The importance of mastering soft skills in the world of work requires educational institutions to design soft skill development programs for learning as a means of building work ethics with midwifery students, including direct learning in the community.[3]

The key to success is 90% determined by soft skills and only 10% determined by hard skills.[4] Ministry of Education in 2009 stated that someone's success in education is 85% determined by soft skills. Education in Indonesia is generally still oriented towards hard skills.[5] The inability to provide soft skills education results in midwifery student graduates only being good at memorizing lessons and having a few skills when they are already on the job.[6] They act like machines because of the mastery of skills but are weak in leading.[7] Soft skills are the skills for dealing with others. The users of college graduates hope that the workforce made up of college graduates has positive soft skills, a strong attitude, is honest, uplifting, able to work together, polite in communication, good at negotiation, has high work motivation, is creative and adaptable, so it can work intensively.[8] Therefore, researchers are interested in analyzing factors related to the communication skills of midwifery students.

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METHOD

This research is quantitative, analytic and descriptive using a cross-sectional design approach and simple random sample.[9] The number of respondents was 38 students at the Department of Midwifery, Ministry of Health, Surabaya Health Ministry. The dependent variable in this study is communication skills. The independent variables are motivation, self-leadership strategies, job satisfaction, self-efficacy, psychological empowerment, task commitment, and communication skills. The instruments used in data collection are questionnaires that have been tested for validity and reliability. The analysis used was the Spearman Rho correlation test with p = 0.05.

RESULTS

Table 1: Frequency Distribution of Respondent Characteristics

No.	Indicator	Category	Frequency	
			Σ	%
1.	Age of Respondents	18	1	2.6
		19	1 0	26.3
		20	2 6	68.5
		21	1	2.6
2.	Number of siblings	Single	4	10.5
		1	13	34.2
		2	15	39.5
		3 or more	6	15.8
3.	Child to (child order)	First	24	63.2
		Second	7	18.4
		Third	6	15.8
		Fourth	1	2.6
4	Reasons for studying	Parental encouragement	15	39.5
	midwifery	Own desire	19	50.0
		Did not pass the SBMPTN	4	10.5
5.	The desire to study at Sutomo	Own	23	60.5
		Parent	15	39.5
6.	Initial ideas	Midwifery	9	23.7
		Doctor	8	21.1
		Other: businessman, etc.	21	55.3
7.	Interest in clinical / field	Interest	1 4	36.8
	practice	No interest	2 4	63.2
8.	GPA	<3	1	2.6
		3 - <3.5	10	26.3
		3.5 or more	27	71.1

Table 1 shows that more than half of the students are a first child and wished to study the Sutomo D3 Midwifery Study Program in Surabaya themselves. Most respondents prefer learning clinical practice and more than half have a GPA of 3 or more.

Table 2: Relationship motivation, self-leadership strategies, self-efficacy, psychological empowerment, task commitment, communication skills, job satisfaction with communication skills for midwifery students.

Variable	Communication Skill						Total		r^2	p
Motivation	Good		Enough		Weak					
	N	%	N	%	N	%	N	%		
Strong	0	0	0	0	0	0	0	0		
Medium	0	0	1	2.6	10	26.3	11	28.9		
Weak	0	0	5	13.2	22	57.9	27	71.1	0.678	0.000
Total	0	0	6	15.8	32	84.2	38	100		
Strategy Self leadership	Good		Enough		Weak		**Total**		**r^2**	**p**
	N	%	N	%	N	%	N	%		
Good	0	0	4	10.5	2	5.3	6	15.8		
Enough	0	0	0	0	0	0	0	0		
Weak	0	0	2	5.3	30	78.9	32	84.2	1.000	0.100
Total	0	0	6	15.8	32	84.2	38	100		
Psychological empowerment	Good		Enough		Weak		**Total**		**r^2**	**p**
	N	%	N	%	N	%	N	%		
Height	0	0	0	0	0	0	0	0		
Medium	0	0	6	15.8	0	0	6	15.8		
Low	0	0	0	0	32	84.2	32	84.2	1.000	0.100
Total	0	0	6	15.8	32	84.2	3 8	100		
Self efficacy	Good		Enough		Weak		**Total**		**r^2**	**p**
	N	%	N	%	N	%	N	%		
High	0	0	0	0	0	0	0	0		
Medium	0	0	6	15.8	32	84.2	38	100		
Low	0	0	0	0	0	0	0	0	1.000	0.100
Total	0	0	6	15.8	32	84.2	38	100		
Task commitment	Good		Enough		Weak		**Total**		**r^2**	**p**
	N	%	N	%	N	%	N	%		
High	0	0	0	0	0	0	0	0		
Medium	0	0	1	2.6	9	23.7	10	26.3		
Low	0	0	5	13.2	23	60.5	28	73.7	0.725	0.000
Total	0	0	6	15.8	32	84.2	38	100		
Communication Skill	Good		Enough		Weak		**Total**		**r^2**	**p**
	N	%	N	%	N	%	N	%		
Good	0	0	0	0	0	0	0	0		
Enough	0	0	2	5.2	4	10.6	6	15.8		
Weak	0	0	4	10.6	28	73.6	32	84.2	1.000	0.100
Total	0	0	6	15.8	32	84.2	38	100		
Job satisfaction	Good		Enough		Weak		**Total**		**r^2**	**p**
	N	%	N	%	N	%	N	%		
Very satisfied	0	0	6	15.8	0	0	6	15.8		
Satisfied	0	0	0	0	28	73.7	28	73.7		
Less satisfied	0	0	0	0	4	10.5	4	10.5		
Not satisfied	0	0	0	0	0	0	0	0	0.819	0.000
Total	0	0	6	15.8	32	84.2	38	100		

Table 2 above shows that the results of the statistical test Spearman's rank correlation coefficients or Spearman's Rho in the relationship of motivation, job satisfaction and task commitment with communication skills show a significance value (p-value) p = 0.000. The significance level used is p <0.05 meaning that H0 is rejected and H1 is accepted that there is a relationship between motivation, job satisfaction and task commitment, and communication skills. The correlation results coefficient shows r = 0.678, r = 0.819 and r = 0.725 which means that there is a strong correlation with the direction of a positive relationship. The Spearman's Rho test on the relationship between self-leadership strategies, psychological empowerment, self-efficacy and communication skills with communication skills shows absolute p-value, meaning that there is no relationship between self-leadership strategies, psychological empowerment, self-efficacy and communication skills with communication skills.

DISCUSSION

The results showed that there was a relationship between motivation and communication skills in midwifery students with a high correlation in the direction of a positive relationship. Based on the results of the study it can be seen that respondents with moderate and weak motivation could have both sufficient and weak communication skills. Communication skills are one of the parameters of interpersonal soft skills, where soft skills are abilities that are used for themselves and relate to others, for working together in groups, and with others. To be able to connect with other people, a good communication process is needed. In order for communication to work well in accordance with one's goals, then one must have good communication skills.[10]

Motivation is important because motivation is the thing that causes, distributes and supports human behaviour so that people want to work hard and enthusiastically to achieve optimal results.[11] Midwifery students are midwives who have a role in giving midwifery care to clients, and so that they can fulfil their role well, some skills are needed, one of which is communication skills.

Motivation both from individual students and motivation that comes from or originates from the students themselves. Motivation is able to move someone so that they have a desire and willingness to do something to get results or achieve certain goals. The clearer the goals expected or to be achieved, the more clearly how motivation is carried out. Motivation is needed for a person's efforts to achieve optimal results or goals. One of the efforts required is the ability to communicate.

The results showed that there was no relationship between motivation and communication skills in midwifery students. Based on the results of the study, it can be seen that respondents who have good and weak self-leadership strategies have weak and sufficient communication skills. The ability of self-leadership, then a person will have 5 disciplines, namely the discipline of renewal, the discipline of knowledge that is abundant, the discipline of the body means expressed as we care for our bodies, so we take care of our minds [2]. Knowing other people is intelligence: knowing yourself is true wisdom.[12] This makes it clear that communication skills require the ability to be able to know other people, but what is important is the ability to know yourself.[13] A person will be able to recognise and control themselves if the individual has good self-leadership skills.[14]

The results showed that there was no relationship between psychological empowerment and communication skills in midwifery students. This is not in accordance with the statement that empowerment means giving power to people who operate in unfavourable situations in an organization.[11] Psychological empowerment of individuals will produce several positive things, namely work results and improving the work process, as well as sharing knowledge, skills, and experience better. Psychological empowerment can improve the work process. In order for communication to work effectively, one must have good communication skills.[15]

Communication skills are absolutely necessary for every individual, especially for those who work in an organisation or company.[4] A person›s communication skills can make it easier for individuals to convey brilliant ideas to their boss or co-workers. With good communication skills, it will be young for someone to present their ideas so that the idea might be accepted even greater. Although in this study psychological empowerment is not related to student communication skills, the increase in psychological empowerment is still very necessary because high psychological empowerment can have a positive impact on the improvement of other

variables that can improve performance.

The results showed that there was no relationship between self-efficacy and communication skills in midwifery students. Self-efficacy is a person's belief that he/she is able to do something or someone's belief that he/she is able to achieve results in accordance with the stated goals. In communication skills, a communicator already has the objectives to be achieved through his communication activities.[16] Effective communication is the delivery of messages that are carried out in accordance with the intent and purpose of the sender of the message. Effective communication is what is desired by every communicator. With effective communication, fundamental problems in communication such as misunderstandings and messages that cannot be overcome do not arise.

This study found that most of the communication skills of students in physiological midwifery care practices were in the weak category but the students mostly had self-efficacy in the sufficient category. Although no relationship was found between self-efficacy and communication skills, self-efficacy is high on the list of a person's will to believe in order to achieve communication goals he/she has set.

The results showed that there was a relationship between task commitment and communication skills in midwifery students with a high correlation with a direction towards positive relationships. Based on the results of the study, it can be seen that respondents who have low task commitment can both have weak communication skills. Commitment always reflects a sense of trust, sincerity and a very strong desire to always be willing to earnestly develop, maintain and work for the interests of an organisation without wanting to leave the organisation.[4] A highly committed person is a superior person. A person who upholds high commitment actualises the work culture in total.

Building commitment is not easy, especially building commitment to the organisation. The emergence of commitment in a person is strongly influenced by factors such as the atmosphere of the workplace environment, leadership, workload, and compensation obtained. But the most important thing is that the commitment is not waiting for the organisation or leader, but commitment will be better if it arises because of self-awareness about the importance of doing or completing tasks to achieve individual and organisational goals.

Today's leaders must be able to become pioneers; thus, a leader can show his function as a creator of growth and learning. This means that the leader is the creator of growth and learning, both for himself and for those who are under his responsibility. A person with appropriately high commitment will feel the benefits, namely by improving their performance as a leader and for the people being led.

The results showed that there was a relationship between job satisfaction and communication skills in midwifery students with a high correlation with a direction towards a positive relationship. Based on the results of the study, it can be seen that respondents who have job satisfaction are very satisfied and can have sufficient communication skills. Job satisfaction factors are a good initial input for developing a model of job satisfaction, job satisfaction and not for job satisfaction due to several factors or dimensions that cause satisfaction or job dissatisfaction.[17] If the perception of people or individuals towards the dimensions of job satisfaction is positive then the individual will feel satisfied, and vice versa.[18] The results of this study indicate that job satisfaction is related to communication skills, so specifically, the Midwifery Study Program still needs to try and pay attention to job satisfaction.

CONCLUSION

Motivation, job satisfaction and task commitment are closely related to the communication skills of midwifery students. The advantage of having good communication skills is that they will facilitate students in carrying out various clinical skills in the world of midwifery work.

Ethical Clearance: This study has passed the institutional review board from the Health Ministry Polytechnic of Surabaya, number 016 / S / KEPK / V / 2017.

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REFERENCES

1. Suryani ES. Peningkatan Kemampuan Soft Skills Kepemimpinan dan Komunikasi Mahasiswa Kebidanan Melalui Community Based Medical

Education (CBME). Bidan Prada J Publ Kebidanan Akbid YLPP Purwokerto. 2015;6(1).

2. Kuswara H. Apapun Mata Kuliah Yang diasuh Berikan Muatan soft skills Didalamnya. Available: www frieyadie com htm Diakses tanggal. 2008;3.

3. Hariko R. Landasan Filosofis Keterampilan Komunikasi Konseling. J Kaji Bimbing dan Konseling. 2017;2(2):41–9.

4. Mardatillah A. Think and Grow Success by Soft Skill. Solo Ary Haeko Sinergi Persada. 2016.

5. Puliam MG. Skill Employer Seek. Career Corner, Excelsior College. 2015.

6. Mestdagh E, Van Rompaey B, Peremans L, Meier K, Timmermans O. Proactive behavior in midwifery: A qualitative overview from midwifery student's perspective. Nurse Educ Pract. 2018;31:1–6.

7. Wibowo A. Pendidikan karakter: Strategi membangun karakter bangsa berperadaban. Pustaka Pelajar; 2012.

8. Furber C, Hickie J, Lee K, McLoughlin A, Boggis C, Sutton A, et al. Interprofessional education in a midwifery curriculum: the learning through the exploration of the professional task project (LEAPT). Midwifery. 2004;20(4):358–66.

9. Nursalam M. Metodologi Penelitian Ilmu Keperawatan Edisi ke-4. Jakarta: Penerbit Salemba Medika; 2015.

10. Taheri S, Farzi S, Tiznobaik A, Taghinejad H, Rezaei N, Suhrabi Z, et al. Optimism, Communication Skills and Its Related Factors in Midwifery Students. J Clin Diagnostic Res. 2018;12(6).

11. Wirawan D. Kepemimpinan: Teori, Psikologi, Perilaku Organisasi, Aplikasi dan Penelitian. Edisi; 2013.

12. Kowalski TJ, Lasley TJ, Mahoney JW. Data-driven decisions and school leadership: Best practices for school improvement. A & B/Pearson; 2008.

13. Houghton JD, Dawley D, DiLiello TC. The abbreviated self-leadership questionnaire (ASLQ): A more concise measure of self-leadership. Int J Leadersh Stud. 2012;7(2):216–32.

14. Chaijukul Y. An examination of self-leadership performance mechanism model in Thai private organization. J Behav Sci. 2010;5(1):15–32.

15. Marchand A, Demers A, Durand P. Does work really cause distress? The contribution of occupational structure and work organization to the experience of psychological distress. Soc Sci Med. 2005;61(1):1–14.

16. Wahyuni E. Hubungan self-effecacy dan keterampilan komunikasi dengan kecemasan berbicara di depan umum. J Komun Islam. 2015;5(1):51–82.

17. Ram P. Relationship between job satisfaction and job performance in the public sector-A case study from India. Int J Acad Res Econ Manag Sci. 2013;2(2):16.

18. Platis C, Reklitis P, Zimeras S. Relation between job satisfaction and job performance in healthcare services. Procedia-Social Behav Sci. 2015;175:480–7.

Improving the Immune Response Il-10 and Secretory Immunoglobulin A in the Elderly after Getting Synbiotic

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ABSTRACT

Increasing age will reduce the body's resistance, so it needs functional foods that can maintain the body's immune system, especially the elderly. This research was conducted to see the synbiotics effect on IL-10 immune response and secretory immunoglobulin A (sIgA) which was done by intervening to the elderly using synbiotics. The results showed that after administration of IL-10 and sIgA ($p < 0.05$) there was an increase in the immune response of the two markers. Based on the results of this study can be recommended the use of synbiotics as an alternative to maintaining the immune system in the elderly.

Keyword: *Functional Foods, Synbiotic, Immune response, Immunoglobulin A*

INTRODUCTION

Elderly people grow very fast even faster than other age groups. Demographic implications that arise due to the growth of the elderly, namely the number of elderly population is increasing and according to WHO's projections Indonesia is a country with the number 8 elderly population in the world that is equal to 21,194,000 people or 8.2% of the total population in Indonesia. The other seven countries that have the highest number of the elderly population are China, India, USA, Japan, Russian Federation, Brazil and Germany [(17)].

This shows a very large amount, so if it is not done efforts to improve the welfare of the elderly from now on will cause problems and can become a time bomb in the future. The tendency of this problem to arise is also marked by the number of elderly dependents according to the 2008 BPS Susenas of 13.72%.

The population dependency rate will be high and felt by the population of productive age if it is coupled with the dependency of the population aged less than 15 years, where the current population of fewer than 15 years is 29.13% [(10)].

Provinces with a higher life expectancy also have more elderly population. A territorial is called old structure if the percentage of people older than 7%. There are 11 provinces in Indonesia with the elderly population more than 7%, namely Yogyakarta Special Region (13.4%), Central Java (11.8%), East Java (11.5%), Bali (10.3%) , North Sulawesi (9.7%), South Sulawesi (8.8%), West Sumatra (8.8%), West Java (8.1%), Lampung (7.8%), West Nusa Tenggara (7 , 7%), East Nusa Tenggara (7.5%)[(1)].

The obstacles faced in the effort to improve the health and welfare of the elderly are the lack of health service facilities and infrastructure that provide friendly health services and are easily accessible to the elderly. In addition, data on the elderly is inadequate and the most recent data on health problems in the elderly based on surveys and research related to the elderly are still very limited. Currently, the data in the new Ministry of Health contains 437 Elderly Community Health Centers and more than 69,500 elderly Posyandu in several districts/cities in Indonesia, but the program has not been maximized[(2)].

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The aging process also leads to a decrease in immune function (immunosenescence), which can increase hyporesponsiveness of vaccination and the tendency for infectious and non-infectious diseases[9].

Synbiotics are functional foods that the body needs. Sinbiotik is a combination of probiotics and prebiotics can be a food substrate that reaches the large intestine and can affect the composition and activity of bacteria present through fermentation capacity in the elderly. The metabolic products of intestinal bacteria can affect the immune system. Modulation of intestinal microflora by diet is the basis for the synbiotic concept. Various strains of bifidobacteria and lactobacillus as probiotics have also been shown to exert immunostimulatory properties[7].

In general, reports of research results in an increase in the amount of lactobacillus, bifidobacteria, or both and enterobacteria decrease after administration of FOS(20). The synbiotics function interacts with immune cells or receptors to improve the phagocytic function of white blood cells, increase IgA after contact with antigens, increase intraepithelial leukocyte proliferation, Th1 / Th2 cell regulation, induction of cytokine cytosis[17]. However, research has not fully determined its effect on the intestinal microflora of older people.

MATERIAL AND METHOD

This study aims to make recommendations to the elderly in order to improve the immune response (with parameters Il-10 and sIgA) so that the health status of the elderly can be maintained. This research was carried out for 3 months with the intervention using synbiotics that is in November 2015 to February 2016 in the elderly in the Mangasa Health Center in Makassar City.

The main tools used to make measurements were 1) ELISA (The enzyme-linked immunosorbent assay) to measure blood serum Il-10 and 2) the measurement was measured from the feces also using ELISA (21), 3) the study subjects were elderly, aged 60 - 70 years old, Makassar tribe, has no history of degenerative and infectious diseases with doctor's recommendations, free from probiotic and prebiotic intake and antibiotics, so the sample size is 12 people who get synbiotics.

Evidence of the effectiveness of this simple method implemented by several steps: 1) validation of synbiotics obtained from pharmacies with registration by the Republic of Indonesia Food and Drug Supervisory Agency 2) Synbiotics consisting of probiotics consisting of L. acidophilus 7.5 mg, L. casei subsp casei 0 , 25 mg, L. rhamnosus 10 mg, L. bulgaricus 12.5 mg, Bifidobacterium breve 5 mg, B. longum 5 mg, Streptococcus termophillus 9.75 mg and Fructooligosaccharide (FOS) as prebiotics 350 mg., 3) measure response immune IL-10 uses ELISA before and after getting synbiotics for 2 months using 3 cc of blood to get the serum and feces to measure the blood pressure taken at the Hasanuddin University Teaching Hospital Laboratory, 4) supplement control is carried out by enumerators conducted by supervision every day to the subject while the researcher every 3 days during the study, 4) compares the two measurement results to find out the improvement tan IL-10 and sIgA immune responses.

FINDING

Immune Response Measurement Parameters

Functional food is Indonesia's abundant natural resource including probiotics and prebiotics. The combination of probiotics and prebiotics is known as synbiotics. The usefulness of synbiotics is that it can increase immunoglobulin levels in the elderly, which will have a more positive effect on performance against disease [16].

In addition, Lactobacillus plantarum will reduce the Th1 / Th2 small intestine lamina propria (SILP) ratio. Lactobacillus lactis has an immunomodulating effect that regulates Th1 and Th2 balance, but it can also reduce GATA-3 & Tbet in SILP. Probiotics both Lactobacillus, Bifidobacterium and Streptococcus are promising strategies to prevent or overcome excessive intestinal inflammation and maintain immune homeostasis[14]. The importance of determining molecular biomarkers that are predictive of the immune system can give an indication that the elderly still remain productive, namely IL-10, and sIgA as a biomarker of immune response. The selection based on IL-10 is an anti-inflammatory function that balances Th1 and Th2 cells [8], and sIgA is an adaptive defense that functions as an antibody found on the mucosal surfaces of the mucous tractus digestivus, tractus urogenitalia, and respiratory tractus[12].

Effect of Sinbiotic Giving on IL-10 and sIgA immune responses

Based on the results of the descriptive study, there were 5 men (41.67%) and 7 (58.33%) men, 60-65 years

old, 10 (83.33%) and 2 66-70 years old women. people (16.67%), marital status shows that married 9 (75%) and divorced 3 (25%).

Table 1: Distribution of Immune Response of IL-10 and sIgA in the Elderly after Synbiotic Giving

Respon immune	before	after	p
IL-10 (ng/ml)	110,08±15,47	249,88±190,12	0,005
sIgA (µg/ml)	1,79±0,39	2,92±0,44	0,002

The average profile of IL-10 in group 2 before supplementation of synbiotics was 110.08 ng / ml with a variation of 15.47 ng / ml. After getting treatment, there was an increase of 140.70 ng / ml to an average of 249.88 ng / ml with a variation of 190.12 ng / ml. The results of statistical tests using Wilcoxon test obtained a value of 0.005 <0.05, meaning that there were significant differences in IL-10 profiles between before and after synbiotic supplementation.

The synbiotic supplementation group for sIgA also contained elevated levels of 1.79 ± 0.39 µg / ml to 2.92 ± 0.44 µg / ml, to see the effect of synbiotic supplementation using the Wilcoxon test had a p value of 0.002 <0.05 . This means that there is a significant change in the profile of the treatment group.

CONCLUSIONS AND RECOMMENDATIONS

The results showed that a significant increase in IL-10 and sIgA immune responses in all samples increased with time, although the increase was not too high but still showed a balanced state (homeostasis) to maintain the health of the elderly. It is recommended to provide synbiotics to the main elderly who are in an unhealthy condition to improve the immune response to be healthy.

DISCUSSION

Symbiotic are probiotics and prebiotics that are combined in food products. Probiotics are non-pathogenic microorganisms that live as digestive microflora that can have a positive influence on human health, while prebiotics are substrates or food ingredients for probiotic bacteria, where these substrates will help increase the growth and liveliness of one or more probiotic bacteria that are in one colon, so that physiological and metabolic conditions can be obtained which can provide protection to the health of the digestive tract. A good combination of prebiotics and probiotics can increase the number of good bacteria (probiotics) that can survive in the digestive tract by fermenting the substrates[5][3].

The synbiotic composition has each function, namely, B. breve maintains normal intestinal flora, inhibits E. coli, reduces the growth of Candida albicans. B. longum is preventing colon cancer, allergies, crohn colitis, and high cholesterol with the effects of increased IL-10 and IL-12 [19]. L. bulgaris as a natural antibiotic that works with a broad spectrum also increases immune, anti-tumor or cancer. L. caseisubsp. casei has the effect of increasing NK cell activation (15), inducing differentiation of regulatory T cells[14]. L. rhamnosus has the effect of increasing the capacity of pagocytosis[4]. L. acidophilus increases stimulation of IgA production and capacity for phagocytosis[20][13]. S. thermophiles serve to suppress lymphocyte proliferation by inducing apoptosis[6].

Based on the synbiotic composition used as supplementation material, it reflects pro-inflammatory cytokines by producing IFN-γ because they are bactericidal, suppress chronic colitis, increase commensal bacteria, increase sIgA and increase phagocytosis[4]. The synbiotic composition also directs / potentially increases the immune balance by producing high IL-10 by B. longum and L. casei subp casei so that even on the other hand IFN-γ is produced high but IL-10 is also produced to suppress IFN-γ production. The other side of the synbiotic composition FOS serves to suppress by blocking the growth of pathogens[14]. This is evidenced by the increase in IL-10 after the administration of symbiotic increased significantly.

CONCLUSION

This study recommends functional food ingredients in this case synbiotics that can maintain the health of the elderly while maintaining IL-10 and sIgA while

increasing according to the state of homeostasis. This finding is expected to provide a positive contribution to improve the quality of the elderly immune response and can be developed in other studies in other vulnerable groups such as pregnant women, toddlers, and young women.

Conflict-of-Interest Statement: In this study between researchers and research, subjects did not have a conflict of interest, because subjects did not have personal or informal relationships with researchers.

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Ethical Clearance: The ethics of this study were obtained from the Ethics Commission for Health Research, Public Health Faculty, Airlangga University, Surabaya, Indonesia.

REFERENCES

1. Indonesian Ministry of Health. Elderly Situation in Indonesia May 29 – National Elderly Day. Jakarta: data and information Center; 2016.
2. Ministry of Health of Republic of Indonesia, Services and Improvement of Old Age Health. Center for Public Communication Secretariat General of the Ministry of Health of the Republic of Indonesia, Jakarta. 2015. Available from URL: http://www.depkes.go.id Accesed December 12, 2016.
3. Bogden JD and Louria DB. Diet and human immune function Edited by: Hughes
4. DA, Darlington LG, Bendich A. Humana Press Inc., Totowa, NJ; 2004:79-101.
5. Braat H, Rottiers P, Hommes DW, Huyghebaert N, Remaut E, Remon JP, van Deventer
6. SJ, Neirynck S, Peppelenbosch MP, Steidler L, A phase I trial with transgenic bacteria expressing interleukin-10 in Crohn's disease. Clin. Gastroenterol. Hepatol. 2006;4 (6): 754–9. doi:10.1016/j.cgh.2006.03.028. PMID 16716759.
7. Caglar, E., Kargul B., & Tanboga I. BacterioTherapy and Probiotics Role on Oral
8. HealTh, Review Article Blackwell Munksgaard, 11. Pp. 2005; 131-136.
9. Carmen del Silvina , Alejandra de Moreno de LeBlanc, Rebeca Martin, Florian Chain,
10. Philippe Langella, Luis G. Bermúdez-Humarán, and Jean Guy LeBlanc. Genetically Engineered Immunomodulatory Streptococcus thermophilus Strains Producing Antioxidant Enzymes Exhibit Enhanced Anti-Inflammatory Activities. Appl Environ Microbiol, PMC; 2014.
11. Cedgard L dan Widell A. The Intestinal Microflora, The Immune System and Probiotics. 2011; Available from URL: http://www.wasamedicals.com/pdf/ref_smj_eng.pdf . Accessed 9 November 2013.
12. Emmerich J, Mumm JB, Chan IH, LaFace D, Truong H, McClanahan T, Gorman DM,
13. Oft M. IL-10 directly activates and expands tumor-resident CD8(+) T cells without de novo infiltration from secondary lymphoid organs". Cancer Research 2012; 72 (14): 3570–81. doi:10.1158/0008-5472.CAN-12-0721. PMID 22581824.
14. Kane Robert & Joseph Ouslander. Essentials of Clinical Geriatrics. McGraw-Hill
15. Medical, China; 2013
16. Martono, Heru. Elderly and Systemic Impacts in the Life Cycle. 2010. Available from URL: www.komnaslansia.go.id. Accessed November 19, 2013.
17. Mantis Nicholas J. , Nicolas Rol and Blaise Corthésy. Secretory IgA's Complex
18. Roles in Immunity and Mucosal Homeostasis in the Gut. Mucosal Immunology NCBI, PMC. 2013.
19. Ramachandran L., Shah NP. Effect of addition of Versagel on microbial, chemical,
20. and physical properties of low-fat yogurt. J Food Sci. Pubmed; 2008.
21. Smelt, Maaike J., Bart J. de Haan, Peter A. Bron, Iris van Swam, Marjolein Meijerink,
22. Jerry M. Wells, Marijke M. Faas, Paul de Vos et al. L. plantarum, L. salivarius,and L. lactis Attenuate Th2 Responses and Increase Treg Frequencies in HealThy Mice in a Strain Dependent Manner. Plosone 2012; 7(10).
23. Ogawa T., Y Asai, R Tamai, Y Makimura, H Sakamoto, S Hashikawa, and K Yasuda. Natural killer cell activities of synbiotic Lactobacillus casei ssp. casei in conjunction with dextran. Clin Exp Immuno, PMC, NCBI; 2006.

24. Tadesse Solomon. Probiotics, Prebiotics and Synbiotics as Functional Food Ingredients: Production, Health Benefits and Safety. Journal of Biologically Active Products from Nature; 2013.
25. Toma, M.M., & Pokrotnieks. Probiotics as Functional Food : Microbiological and
26. Medical Aspects. Acta Universitatis Latviensis vol. 710 Biology; 2006.
27. United Nations. World Population Ageing 2015. Department of Economic and
28. Social Affairs Population Division, New York, USA ST/ESA/SER.A/390; 2015.
29. Vidal Emili Barba, Lorena Castillejos, Paola López-Colom, Montserrat Rivero Urgell,
30. José A. Moreno Muñoz, and Susana M. Martín-Orúe. Evaluation of the Probiotic Strain Bifidobacterium longum subsp. Infantis CECT 7210 Capacities to Improve Health Status and Fight Digestive Pathogens in a Piglet Model. Front Microbiol. PMC, NCBI; 2017.
31. Vulevic Jelena, Alexandra Drakoularakou, Parveen Yaqoob, George Tzortzis, and Glenn
32. R Gibson. Modulation of the fecal microflora profile and immune function by a novel trans-galactooligosaccharide mixture (B-GOS) in healthy elderly volunteers. The American Journal of Clinical Nutrition; 2010.
33. Ng EW, Yeung M, Tong PS. Effects of yogurt starter cultures on the survival of Lactobacillus acidophilus. NCBI, Pubmed; 2013.
34. Rockland. antibodies & assays,Enzyme-Linked Immunosorbent Assay (ELISA), https://rockland-inc.com/elisa.aspx. Accessed December 2, 2017.

Emotional Support of Family and Depression Incidence among Elderly in Ngumpul Village, Jogoroto Sub-District, Jombang City

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ABSTRACT

Generally, the physiological decline among elderly both physically and mentally will give an effect such as less sensitive to various stimuli both internal and external so elderly are vulnerable to mental disorders such as depression. The aim of this study to assess the correlation correlation between emotional support of family and depression among elderly who aged 60-74 years old in Ngumpul Village, Jogoroto Sub District, Jombang City. The design of this study was cross sectional. The population was all elderly people who aged 60-74 years old with the number of population is 526 people. The sample size was 55 respondents, selected by simple random sampling. The data were collected by using questionnaire to assess emotional support of family and Geriatric Depression Scale questionnaire to assess depression level of elderly. Moreover, the data were analyzed by using Fisher's Exact Test statistic with $\alpha = 0.05$. The results of this study found that almost all (78.2%) of respondents had good family support, and almost all (87.3%) of respondents did not have depression experience. The results of the Fisher's Exact Test obtained 0.000 <0.005. So, the conclusion in this research was there is relation between emotional supports of family with incidence of depression among Elderly who aged 60-74 years old in Ngumpul Village Jogoroto Sub-district, Jombang city.

***Keywords**: Emotional supports of family, Depression, Elderly*

INTRODUCTION

In essence to grow old is a natural process which means a person has gone through three stages of life, it are: childhood, adulthood and old age. The aging process is an inevitable biological process that everyone will experience. Family support factor is one of factor that can influece stress level among elderly where the higher of family support system will make less stress experienced by elderly. However, a feeling of wasted from family also can increase the stress level among elderly where they were deposited in institution of elderly [(1)].

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A person who experienced stress can be seen from the changes of physical condition. Complaints are often felt among people who experienced stress are angry, moody, anxious, anxious, sad, depressed, pessimistic, crying, mood or mood often change, decreased self-esteem or feel insecure, irritable, and has hostility, nightmares, and concentration / memory problem [(2)]. Family support was needed for elderly. Family members' support is good examples for the elderly, such as doing or giving suggestion for healthy daily living. Family members who taking care or much give support for elderly in doing what they want to do [(3)].

In 2010, the number of elderly in Indonesia an estimated 23.9 million or 9.77 % and in 2020 will increasing with estimate 28.8 million or 11.34 %. In East Java the incidence of depression reached 7.18 %, depression became one of the problems of mental disorders that are often occur among elderly [(4)]. Based on data from the Central Bureau of Statistics (BPS) in 2015 the number of Elderly in East Java reached 4,209,817

people or (11.14 %) of the total population in East Java (37,794,003 people). Based on data from the Jombang District Health Office in 2014 it was found that the data of elderly number in Puskesmas Mayangan Jombang is 11,615 people [5]. The elderly data in Ngumpul village which is the work area of Puskesmas Mayangan and the village built by FIK Unipdu Jombang in December 2016 amounted to 526 people.

Based on preliminary study in Ngumpul Village Jogoroto Sub-district Jombang Regency in December 2016 from 10 elderly people who had measured by GDS scale (geriatric depression scale) and found 60 % (6 people) experienced depression in severe level, 20 % (2 people) experienced depression in moderate level and 20% (2 people) experienced depression in small level. Moreover, for family support there are 5 people who never get support, 2 people sometimes get support, 2 people often get support and 1 person always get support from family.

Family support is one form of family therapy for elderly who experienced depression. So with give family support at leats they have family emotional feelings and it will give support for elderly and the elderly also can go through a period of their life. Therefore, the support from various level are needed, ranging from government institution to the family level to take care of the elderly life either through posyandu elderly, increasing the role of elderly in the organization, intergenerational relationship coaching, and skills training for the elderly. Because in the group, the elderly can discuss about health, brainstorming, and gymnastics together [6].

Based on the data above, the researchers interested in conducting research on "relationship between emotional support of family and the incidence of depression among elderly in the Ngumpul Village, Jogoroto District-Jombang".

MATERIALS AND METHOD

The design of this study was cross sectional. Population in this study were all elderly who aged 60-74 years old in Ngumpul Village Jogoroto Sub-District, Jombang city (population size was 526 people). Sample size was 55 people selected by simple random sampling. The study was conducted in May 2018. The independent variable was emotional support of family and dependent variable was incidence of depression. Data were collected using questionnaire.The categorical data were presented in the form of frequency and percentage [7], then analyzed by Fisher's Exact Test.

FINDINGS

Table 1. Distribution of general data of respondent

Number	General data	Frequency	Percentage
1	Education		
	Not attend the school	27	49.1
	Elementary & Secondary School	20	36.4
	High School	6	10.9
	University	2	3.60
2	Gender		
	Male	8	14.54
	Female	47	85.46
3	Information		
	Ever	44	80.0
	Never	11	20.0
4	Information source		
	Health care provider	44	100.0
	Magazine	0	0
	Radio/TV	0	0
	Internet	0	0
	Total	55	100

Tabel 2. Distribution of emotional support of family data with depression incident among elderly who aged 60-74 years old

Number	Specific data	Frequency	Percentage
1	Emotional support of family		
	Less	0	0
	Moderate	12	21.8
	Good	43	78.2
2	Depression incident		
	Depression	7	12.7
	Not depression	48	87.3
	Total	55	100.0

Tabel 3. Correlation between emotional support of family and depression incident among elderly who aged 60-74 years old

Emotional support of family	Depression level				Total	
	depression		Not depression			
	å	%	å	%	å	%
Enough	6	10.9	6	10.9	12	21.8
Good	1	1.8	42	76.4	43	78.2
Total	7	12.7	48	87.3	55	100
p = 0.000 a = 0.05						

DISCUSSION

Emotional Support of Family

Almost all (78.2%) of respondents had good emotional support of family. The emotional support of family is an attitude, action and acceptance of family for family member who sick. Family as a safe and peaceful place to rest and restore also manage the emotions. Aspects of emotional support are including support form of affection, trust, attention, listen and listening. Family members think that supportive people are always ready to provide help and assistance if needed[8].

Family support is important to someone. In this study found that alsmost all elderly have good family support. This is makes the elderly feel calm in their daily life so they rarely feel worried.

Almost half of respondents have elementary and secondary education (46%). The higher level of education will likely get support from the people around him. The basic concept of education is a meaningful process of learning in education and it has growth process, development or change toward a better mature, and more mature in the individual, group or community[9].

Respondents who educated in elementary school and secondary school are able to think more mature that respondents feel that they have support from their family to go through to their elder period, so they can feel calm and not worry when faced with problems because theyhave strong emotional support of family and family availability to provide time to give solutions to their problems. Moreover, elderly who educated in elementary, junior high school were get good support from the family and also this because the elderly also ever get information from health workers about mental health and how to deal with depression among elderly.

Depresson incident among elderly who aged 60-74 years old

Almost all (87.3%) of respondents were not have depression experience by 48 people. Depression is a natural disorder of mood that is characterized by depth and sadness and continued until feels lose of life, not has problem about reality testing abilities / RTA is still good, personality remains intact (no splitting of personality), the behavior can be disrupted but within normal limits[2]. Depression is a disturbing mood of feelings, with the main symptom of sadness. This symptom was easy to find with the prevalence rate of 4-5% of the population, ranging from less, moderate, or severe degrees of disturbance. Judging from the clinical aspect, depression can stand on its own, is a symptom of another disease, has various physical symptoms, or occurs along with other diseases (comorbidities), so it can complicate management[10].

Depression that occurs in the elderly in a category where the level of depression is not disruptive or obstructing in their life, so they can still carry out daily activities on a regular and timely basis and the elderly also happy to do their daily activities. According to researchers at the interview time found that the respondent who has depression was becuase of bed an event or unconditional environment (often left by their families), anxiety, negative thoughts (bored living in this world) and a small percentage of family members who have experienced depression.

Almost half (46%) of the respondents were hold elementary school, secondary school and high school. Education means that the guidance for someone to the development of others person to get their ambition and in the end they get achievement and happiness. Education is needed to get information such as things that support health so as to improve the quality of life. Education can affect a person as well as a person's behavior of lifestyle especially in motivating to participate in the attitude of development. In general, the higher of education will more easily receive information.

According to the researcher someone who educated has a good way of thinking, especially in dealing with a problem for elderly. With a good way of thinking so the respondents when faced with a problem can solve and prevent depression.

Almost all respondents (80%) received information sources from health workers. The ease of obtaining information can help accelerate a person to increase new knowledge. According to researchers of the elderly who get the source of information from health workers will get the right information about the importance of doing emotional calm in the aging process so that they do not experience depression.

Relationship of emotional support of family with depression incidence among elderly who aged 60-74 years old

There is a relationship between emotional support of family and the incidence of depression among Elderly who aged 60-74 years in the Ngumpul Village, Jogoroto District Jombang.

Depression is a period of disruption of human function associated with the nature of sad feelings and symptoms, including: changes in sleep patterns and appetite, psychomotor, concentration, anhedonia, fatigue, despair and helplessness, and the risk of suicide. Depression can be a chronic and repetitive problem that will result in someone being unable to take care of themselves, besides depression can also lead to suicide. But depression in the elderly can be prevented by the emotional support of family. Family support is a combination of attitudes and acceptance that can help old age deal with problems. There are several forms of family support such as information support, assessment support, instrumental support, and emotional support[11].

Emotional support of family is a form of family therapy that can be given to elderly people who are depressed, through family a variety of health problems that arise at once can be overcome. So with the support of families who have an emotional bond at least will give strength to the elderly to live a better old age, therefore it needs support from various parties, ranging from government agencies to the family level to care for the lives of the elderly through the elderly posyandu, improve the role of the elderly in political and religious organizations, as well as enhancing spiritual formation at the end of the elderly life.

CONCLUSION AND RECOMMENDATION

Conclusion

Emotional support of family in Ngumpul Village, Jogoroto District, Jombang District is almost entirely good.

The incident of depression among elderly who aged

60-74 years in Ngumpul Village, Jogoroto District, Jombang District, almost entirely is not depressed.

There is a relationship between emotional support of family with the incidence of depression among elderly who aged 60-74 years in the village of Ngumpul Jogoroto District, Jombang Regency.

Suggestion

Can provide adequate education and information for the elderly and families such as lifestyle, ways of daily adaptation, personality strength and interest.

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REFERENCES

1. Rosmiaty. Faktor Stress Lansia (Factors of Stress in Elderly). 2006. Available from: http://journal.respati.ac.id/index.php
2. Hawari D. Stress Management, Anxiety and Depression (Manajemen Stress, Cemas dan Depresi). Jakarta: Fakultas Kedokteran Universitas Indonesia; 2011.
3. Azizah L. Family Support to Reduce Stress (Dukungan Keluarga Menurunkan Kecenderungan Stress). 2011. Available from: http://journal.respati.ac.id/index.php.
4. Kaplan, Sadock. Depression is A Mental Disorder Diagnose (Depresi sebagai Suatu Diagnosa Gangguan Jiwa). 2010. Available from: https://core.ac.uk/download/files.pdf.
5. Dinas Kesehatan Jombang. Elderly Population in Jombang (Jumlah Lansia di Jombang). 2015.
6. Amareta. Dukungan Keluarga Bentuk Penatalaksanaan Stress Lansia (Family support as form of management stress for elderly). 2008. Available from: http://repository.poltekkesmajapahit.ac.id/index.php
7. Nugroho HSW. Descriptive Data Analysis for Categorical Data (Analisis Data secara Deskriptif untuk Data Kategorik). Ponorogo: Forum Ilmiah Kesehatan (FORIKES); 2014.
8. Friedman. Social Family Support (Dukungan Sosial Keluarga). 2010. Available from: http://repository.poltekkesmajapahit.ac.id/index.php.
9. Kodriati. Factors Influence Family Support (Faktor-Faktor yang Mempengaruhi Dukungan Keluarga). 2004. Available from: http://www.library.upnvj.ac.id/pdf.
10. Sudiyanto. Definition of Depression (Pengertian Depresi). 2010. Available from: https://core.ac.uk/download/files.pdf
11. Wiguna. Depression among Elderly (Depresi pada lansia). 2010. Available from: http://eprints.undip.ac.id/12804

Role of Procalcitonin in Detection of Bacterial Pneumonia

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ABSTRACT

The current study aimed to assess the role of procalcitonin in detection of bacterial pneumonia and to compare the application of this marker with other routine tests. This study conducted during the period from November 2017 to April 2018 at Al Sadder Medical city in Najaf included 42 pneumonia patients and 42 apparently healthy individuals as control group, patients and controls were almost matched for age and gender. Sputum specimens were collected from patients under the supervision of the physician and immediately inoculated. A sample of venus blood was withdrawn aseptically and sent for. Hematological and immunological tests. Culture results revealed bacterial pneumonia in 29 patients (69%). Results of identification have shown Streptococcus pneumoniae (31%), Klebsiella Pneumoniae (23.8%), Escherichia coli (7.1%), Stenotrophomonas Maltophilia, Streptococcus pyogenes and Haemophilus Influenza (2.4%) for each. The mean procalcitonin level was significantly higher in patients with bacterial pneumonia (971.71) compared to those with other types of pneumonia (634.00) and controls (227.40), and it appeared to be good predictor for detection of bacterial pneumonia and it was able to differentiate bacterial pneumonia from other causative pneumonia, than other tests used in this study.

Keywords: *Procalcitonin, pneumonia, bacteria, C-reactive protein*

INTRODUCTION

Pneumonia is an illness, usually caused by bacterial, viral or more rarely fungal organisms[1]. It has been identified as the major (forgotten killer of children) by the United Nations Children's Fund (UNICEF) and WHO [2]. The World Health Organization defines pneumonia as an acute disease episode with cough combined with fast breathing with age specific cut-values for increased respiratory rate. This case definition of childhood pneumonia is widely used in poor-resource settings to guide the management of pneumonia [3]. Pneumonia has received very little attention as there has been little research on the disease apart from vaccine trials that included the evaluations of the impact of these vaccines on pneumonia[4].

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Procalcitonin rises very fast in bacterial infections, making it a good biomarker for bacterial infections. Alongside other calcitonin precursor peptides, PCT is found in the serum in physiological conditions, but the PCT levels detected are very low <0.1 ng/ml. However, in pneumonia patients, the PCT level increases, sometimes to the levels of more than several hundreds of Nanograms per milliliter [5].

Aim of this study is to diagnose pneumonia caused by bacteria using procalcitonin and compare it with some other markers.

MATERIALS AND METHOD

Study Design

A total of 42 pneumonia patients and 42 apparently healthy individuals (controls) were enrolled in this study. Those patients attended the emergency departments at Al-Sadr Medical City and Al-Hakeem hospital of Al-Najaf province during the period from November 2017 till April 2018. Samples were obtained from different age groups and of both genders.

Sputum specimen was obtained using universal container after providing the patient suspected to have pneumonia with appropriate instructions. Whole blood was withdrawal from vein, under aseptically conditions. Specimens of blood were collected in EDTA tube and gel tube. The EDTA tubes were subjected for hematological tests, while gel tubes were used for immunological methods including PCT and C-reactive protein[6].

Sputum Processing and Bacterial Identification

Bacterial isolated recovered from sputum culture were identified to the species level on the basis of macroscopic observation of bacterial colonies morphology, and micromorphological characteristics and biochemical tests confirmed lately using automated system of VITEK2 technique [7, 8].

Hematological Tests

Total WBCs

The diluted blood suspension was placed in a chamber then the cell was counted and multiplied by dilution factor and reported as number of cells per microlitter[9].

Differential Counts

Differential leukocytes was automatically counted using hematology analyzer. Erythrocyte

Sedimentation Rate

The settling of red corpuscles was measured in mm/hr using the Modified Westergren Method[9].

Immunological tests

Procalcitonin (PCT) Test

Procalcitonin was detected using Elissa technique following the procedure written in the kit which included; the addition of 50µl of standard to the standard well. While the testing sample well contained 10µl of serum and 40µl of Diluent leaving blank well without any addition, 100µl of HRP-conjugate reagent was added to each well covered with an adhesive strip and incubated for 60 minutes at 37°C. Washing process was repeated five times by filling each well with Wash Solution (400µl) using a squirt bottle, manifold dispenser or auto-washer. Aspirating or decanting the wells were performed by inverting the plate and blot it on a clean paper towel. 50µl of chromogenic A solution and 50µl of chromogenic solution B were added to each well. Gently mixed and incubated for 15 minutes at 37°C and Protected from light. 50µl of stop Solution was added to each well. Optical Density (O.D.) was read at 450 nm using a microtiter plate reader within 15 minutes[10].

C-reactive Protein (CRP) Strip Test

Ten ml of standard, diluted samples and controls were dispensed into the appropriate wells (dilution 1:100 was done by adding 5 ml of samples to 495 ml of sample Diluent). 100 ml of enzyme conjugate was added to all wells tapping the holder to remove air bubbles from the liquid and mixed well and incubated for 60 minutes at room temperature (20-25 C). Liquid was removed from all wells by washing wells three times with 300 ml of 1X wash buffer and blotted on absorbent paper towels. Add followed by applying 100 ml of TMB substrate to all wells and Incubation for 15 minutes at room temperature. Finally 50 ml of stop solution was added Add to all wells and the absorbance was read on ELISA reader at 450 nm within 15 minutes[11].

Statistical analysis

Statistical analysis using Chai square, Student's t-test, ANOVA test and Receiver operating characteristics (ROC) were performed to analyze data according to the type of variables within Level of significance of <0.001 and occasionally < 0.05 [12].

FINDINGS

There were 42 patients with pneumonia and 42 apparently healthy individuals (controls) enrolled in this study. Patients and controls were almost matched for age and gender, (P>0.05). Pneumonia was relatively more frequent in males 22 (52.4%) than females 20 (47.6%), with no statistically significant difference, (P > 0.05), also no significant difference in residence between cases and controls, (P>0.05), (Table 1). Regarding the type of growth, Streptococcus Pneumoniae and Klebsiella Pneumoniae were the more frequent types; 31% and 23.8%, respectively, However, all other pneumonia represented 31%, (Table 2). The comparison of mean PCT and CRP between cases and controls revealed that pnumonia patients had significantly higher mean level of both PCT and CRP, (P<0.001), on the other hand , when pneomonia patients subgrouped as , with bacterial pneumonia and those with other pneumonia

and compared against controls, the PCT and CRP levels were significantly higher in these two subgroups than controls, (Table 3). Regarding the comparison of WBC (Total and Differential) count and ESR level between cases and controls groups , it had been significantly found that pneumonia cases had higher WBC , count, granulocyte percent, lymphocytes percent and ESR, in all comparison, (P< 0.001), (Table 4). To assess the validity of PCT in prediction and differentiation of bacterial pneumonia than other pneumonia, Receiver Operating Characteristics (ROC) curve analysis was used (Figure 1) and revealed that PCT was able to differentiate bacterial pneumonia than other types of pneumonia and it was good predictor for bacterial pneumonia (Area under the curve was 0.811) , with a sensitivity , specificity and accuracy of 96.3%, 74.6% and 85.6%, respectively. Conversely, CRP was weak predictor and failed to predict or differentiate bacterial pneumonia with low sensitivity , specificity and accuracy; 53.3%, 42.6% and 50.2%, respectively, (Table 5).

Table 1. Results According to Gender, Age group and Residence

Variable No.		**Pneumonia group (n = 42)**		**Controls (n = 42)**		**P. Value**
		%	**No.**	**%**		
Age (year)	< 40	7	16.7	6	14.3	0.49
	40 – 49	9	21.4	14	33.3	
	50 – 59	11	26.2	12	28.6	
	≥ 60	15	35.7	10	23.8	
Gender	Male	22	52.4	23	54.8	0.58
	Female	20	47.6	19	45.2	
Residence	Urban	28	66.7	25	59.5	0.65
	Rural	14	33.3	17	40.5	
SD: Standard deviation						

Table 2. Types of Bacterial Isolates of Pneumonia Patients

Bacterial Isolate	**No.**	**%**
Streptococcus Pneumoniae	13	31.0
Klebsiella Pneumoniae	10	23.8
Escherichia Coli	3	7.1
Stenotrophomonas Maltophilia	1	2.4
Streptococcus Pyogenes	1	2.4
Haemophilus Influenza	1	2.4
Other pneumonia	13	31.0
Total	42	100.0

Table 3. Comparison of PCT and CRP levels between cases and controls

Bacterial Pneumonia		Group		
		Other Pneumonia	Control	
PCT	Mean	971.71[a,b]	634.62[a]	227.40
	SD*	281.38	336.37	22.09
	Range	257.0 – 1358.0	232.64 – 859.26	124.0 – 256.0
CRP	Mean	9.82[a]	8.34[a]	1.39
	SD	3.21	2.89	3.80
	Range	0.01 – 17.75	0.01 – 16.38	0.00 – 13.30

SD; Standard deviation
a, significant difference vs. control, b significant difference than Other Pneumonia

Table 4. Comparison of WBC (Total and Differential) Count and ESR level among the Studied Groups

	Bacterial Pneumonia (n =29)		Other Pneumonia (n = 13)		Control (n = 42)		P. value
	Mean	SD	Mean	SD	Mean	SD	
WBC (x 10^3/ cm)	14.1	2.3	13.9	2.3	7.2	1.5	< 0.001
Granulocyte (%)	81.9	11.0	28.2	7.1	26.0	5.2	< 0.001
Lymphocytes (%)	15.5	9.9	71.5	15.4	46.4	11.7	< 0.001
ESR (mm/hr)	53.2	22.8	21.4	13.2	5.5	3.8	< 0.001

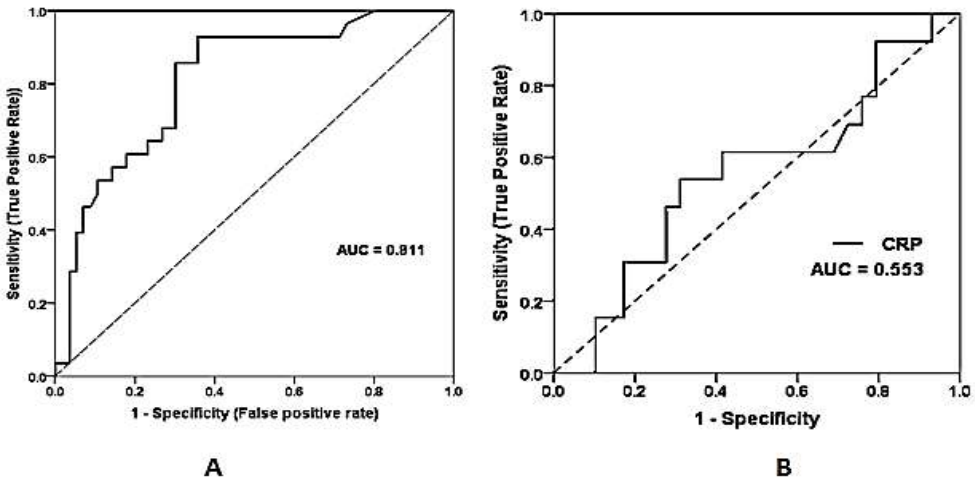

Figure 1. Receiver operating characteristics (ROC) curve for validity of (A) PCT and (B) CRP in prediction of bacterial pneumonia

Table 5. Validity of PCT and CRP parameters in prediction of bacterial pneumonia

Validity parameter	PCT	CRP
Sensitivity	96.3%	53.3%
Specificity	74.6%	42.6%
Accuracy	85.4%	50.2%
Positive predictive value	79.1%	50.4%
Negative predictive value	95.3%	50.6%

DISCUSSION

In the present study , pneumonia was more relativelyfrequent in male than female, (P > 0.05), whch agreed with Naderi et al from Iran [14] who stated that males are more commonly affected with pneumonia. The role of sex hormones in the regulation of the immune system may also contribute to the incidence and severity of the various types of respiratory tract infections, especially in adolescents and adults. Concerning with the age groups, the present study found that the highest incidence of pneumonia was found in the age group ≥ 60 years (35.7%) followed by 50-59 years (26.2%) then 40-49 years (21.4%) then followed by <40 (16.7%).according to the residence, record pneumonia was frequent in urban area (66.7%) as compared to rural (33.3%) (Detailed in table 1) this results was in accordance with the study of El-Azeem et al [15]. Based on sputum culture results, bacterial pneumonia was reported in 29 patients (69%) while negative culture was reported in 13 patients (31%) and assigned as "other pneumonia" which could be viral or others rather than bacterial, however, the most frequent bacterial agent was *Streptococcus Pneumoniae* (31%) followed by *Klebsiella Pneumoniae* (23.8%), *Escherichia coli* (7.1%), and each of *Stenotrophomonas Maltophilia*, *Streptococcus Pyogenes* and *Haemophilus influenza* had reported in only one patient, 2.4%. Those isolates were identified based on microscopical, culture characteristics and finally the automated Vietek-2 compact system using GN-ID and GP-ID cards that included 47 - 50 biochemical tests. These results were in agreement with the study of Aljanaby A from Iraq [16] . Diversity and privilege in bacterial infectious agents could be attributted to that AL- Najaf is always crowded and expatriates from all over the world and from neighboring countries, especially Iran, as most Iranian travelers come to AL- Najaf first and thus help to spread the infection [16]. Based on the statistical results, procalcitonin had significantly the higher mean level in bacterial pneumonia than other pneumonia groups and controls, while CRP, total WBCs and neutrophil percentage were insignificantly different between Bacterial and other pneumonia groups, which indicated that PCT could be a promissing predictor, to prove the validity of PCT, in prediction of bacterial pneumonia, ROC curve analysis was applied and revealed that PCT was a good predictor and was able to differentiate between bacterial and non-bacterial pneumonia, the area under the curve (AUC) was (0.811). It is worth mentioning that the higher AUC close to one indicated good validity and predictive value, furthermore, ROC curve revealed that PCT had a sensitivity of 96.3% , a specificity of 74.6% , accuracy of 85.4%, positive predictive value (PPV) of 79.1% and a negative predictive value (NPV). This study was in agreement with Saleem et al [17], but disagreed with Nouvenne et al [18]. Additionally, ROC curve analysis revealed that CRP failed to predict or differentiate bacterial pneumonia, (AUC = 0.55), indicated that CRP was not valid to predicting bacterial pneumonia and it was non-specific (42.6%) with poor sensitivity (53.3%) and accuracy (50.2%), (table 5). This study was disagreed with Youssef et al [1].

Recently published revised criteria for pneumonia imply the need to apply procalcitonin as a diagnostic tool[19]. A correlation between increased serum concentration and the severity of infection, clinical course, and mortality has been previously reported [20]. The induction of PCT can be caused by different stimuli both *in vitro* and *in vivo*. Bacterial endotoxins and pro-inflammatory cytokines are powerful stimuli for the production of PCT[21].

CONCLUSION

This study can indicate that Procalcitonin was able to differentiate bacterial pneumonia from other causative pneumonia, than other tests used in this study, hence, Procalcitonin test could be a promising marker for detection of bacterial pneumonia assists and facilitate the early diagnosis of bacterial pneumonia in addition to clinical characteristics and clinician practice.

Ethical Permission : All official agreements were approved from the local ethical committee in Najaf Health Directorate. The study protocol approved by the

Council of the college. Signed informed consents were obtained from all participants, patients and controls. Data were collected according to the The World Medical Association Declaration of Helsinki 2013

Conflict of Interest : Authors declared: None.

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REFERENCES

1. Youssef HA, Nasseh S, Hafiz HA, Gawesh A. Evaluation of diagnostic and prognostic value of high sensitivity C reactive protein (Hs-CRP) in community acquired pneumonia. Egyptian Journal of Chest Diseases and Tuberculosis. 2013 Apr 1;62(2):301-4.
2. Samuel Mbugua. PNEUMONIA IN PRE-SCHOOL CHILDREN. 2011
3. Puumalainen T, Quiambao B, Abucejo-Ladesma E, Lupisan S, Heiskanen-Kosma T, Ruutu P, Lucero MG, Nohynek H, Simoes EA, Riley I. Clinical case review: a method to improve identification of true clinical and radiographic pneumonia in children meeting the World Health Organization definition for pneumonia. BMC infectious diseases. 2008 Dec;8(1):95.
4. Greenwood BM, Weber MW, Mulholland K. Childhood pneumonia: preventing the world's biggest killer of children. 2007 Vol. 85, 502.
5. Fazili T, Endy T, Javaid W, Maskey M. Role of procalcitonin in guiding antibiotic therapy. American Journal of Health-System Pharmacy. 2012 Dec 1;69(23):2057-61.
6. Maamouri G, Boskabadi H, Sayedi SJ, Bagheri F, Boskabadi A. The Evaluation of Serum Procalcitonin Levels in Neonatal Infections. International Journal of Pediatrics. 2017;5(7):5287-94.
7. Vandepitte J, Engbaek K, Rohner P, Piot P, Heuck CC, World Health Organization. Basic laboratory procedures in clinical bacteriology/J. Vandepitte... [et al.]. InBasic laboratory procedures in clinical bacteriology/J. Vandepitte...[et al.] 2003.
8. O'Hara CM, Miller JM. Evaluation of the Vitek 2 ID-GNB assay for identification of members of the family Enterobacteriaceae and other nonenteric gram-negative bacilli and comparison with the Vitek GNI+ card. Journal of clinical microbiology. 2003 May 1;41(5):2096-101.
9. Al-Rasheid SM, Al-Sa'adoon ER, Mohammed MJ. Evaluation of Procalcitonin Test for Early Diagnosis of Neonatal Sepsis in Tikrit Teaching Hospital. Journal of university of Anbar for Pure science. 2010;4(3):1-3.
10. Bray C, Bell LN, Liang H, Haykal R, Kaiksow F, Mazza JJ, Yale SH. Erythrocyte Sedimentation Rate and C-reactive Protein Measurements and Their Relevance in Clinical Medicine. WMJ. 2016 Dec;115(6):317-21.
11. Dr.B.Preethi,Dr.M.Roopalatha,Dr.C.Ramakrishna, M. S.Sanjeevi Rao, B.Venkateswara Rao. A Case Control Study of Procalcitonin as A Novel Bio Marker in Sepsis. 2017 IOSR Journal of Dental and Medical Sciences (IOSR-JDMS) e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 16, Issue 4 Ver. IX, PP 45-49.
12. Schultz DR, Arnold PI. Properties of four acute phase proteins: C-reactive protein, serum amyloid A protein, α1-acid glycoprotein, and fibrinogen. InSeminars in arthritis and rheumatism 1990 Dec 1 (Vol. 20, No. 3, pp. 129-147). WB Saunders.
13. Al-Rawi Kh. M., Entrance to Statistics, 2ed ed., 2000, Babylon, Iraq.
14. Naderi H, Sheybani F, Sarvghad M, Meshkat Z, Nooghabi MJ. Etiological diagnosis of community-acquired pneumonia in adult patients: a prospective hospital-based study in Mashhad, Iran. Jundishapur journal of microbiology. 2015 Aug;8(8).
15. El-Azeem AA, Hamdy G, Saraya M, Fawzy E, Anwar E, Abdulattif S. The role of procalcitonin as a guide for the diagnosis, prognosis, and decision of antibiotic therapy for lower respiratory tract infections. Egyptian Journal of Chest Diseases and Tuberculosis. 2013 Oct 1;62(4):687-95.
16. Aljanaby AA. Bacteriological and Immunological study of Streptococcus pneumoniae isolated from patients infected with respiratory tract infection in AL-Najaf Governorate (Doctoral dissertation, Kufa University). 2010.
17. Saleem SM, Khan SS, Jan SS. Role of serum procalcitonin level in early diagnosis of bacterial pneumonia in children, a hospital based study. International Journal of Research in Medical Sciences. 2016 Dec 30;4(5):1518-21.
18. Nouvenne A, Ticinesi A, Folesani G, Cerundolo N, Prati B, Morelli I, Guida L, Lauretani F, Maggio

M, Aloe R, Lippi G. The association of serum procalcitonin and high-sensitivity C-reactive protein with pneumonia in elderly multimorbid patients with respiratory symptoms: retrospective cohort study. BMC geriatrics. 2016 Dec;16(1):16.

19. Giamarellos-Bourboulis EJ, Giannopoulou P, Grecka P, Voros D, Mandragos K, Giamarellou H. Should procalcitonin be introduced in the diagnostic criteria for the systemic inflammatory response syndrome and sepsis?. Journal of critical care. 2004 Sep 1;19(3):152-7.

20. Masia M, Gutiérrez F, Shum C, Padilla S, Navarro JC, Flores E, Hernández I. Usefulness of procalcitonin levels in community-acquired pneumonia according to the patients outcome research team pneumonia severity index. Chest. 2005 Oct 1;128(4):2223-9.

21. Christ-Crain M, Opal SM. Clinical review: the role of biomarkers in the diagnosis and management of community-acquired pneumonia. Critical care. 2010 Feb;14(1):203.

The Influence of Leadership Style and Domicile to Power Distance of Midwife Coordinators and Village Midwives in Hulu Sungai Tengah District

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ABSTRACT

Four mothers in Indonesia died in a day as a result of giving birth. It puts Indonesia as the second highest maternal mortality rate (305/100,000) and infant mortality rate (26/1,000) in Southeast Asia. Health services that contribute directly to reducing MMR are health services during pregnancy or antenatal care, which are mostly carried out by village midwives. Many factors can influence the performance of village midwives between the distance of power. This research uses a quantitative method with a cross-sectional approach. The population were all midwives, both village midwives and midwife coordinators, totalling 200 village midwives and 19 coordinating midwives. The sample was 95 respondents (village midwives) obtained from 13 public health centre in Hulu Sungai Tengah District. Research results show that midwife coordinators with democratic leadership styles tend to show low power distance. Likewise, the village midwife who lives in the target village tends to show power distance between the midwife coordinators and the low village midwives. Two-way communication and openness of superiors characterize low power distance to all members. Low power distance can to create high job involvement and ultimately can produce a good performance. The tendency of the influence of leadership style and domicile of village midwives to power distance between midwife coordinators and village midwives has not shown a significant influence (p = -0.466) and (p = -0.268). So, the leadership style of the midwife coordinators and the village midwives domicile shows a certain tendency of power distance but statistically does not show significance.

Keywords*: leadership style, domicile, power distance, midwife, village*

INTRODUCTION

Based on the 2017 World Bank Report, four mothers in Indonesia died from childbirth. In other words, there is one mother in Indonesia who dies every six hours. One of the data presented is data from the ASEAN Millennium Development Goals (MDGs) in 2017. The data shows that in 2015 maternal deaths in Indonesia still reached 305 per 100 thousand. This figure is three times higher than Indonesia's MDG target, which is 102 per 100 thousand. This figure places Indonesia as the country with the second highest mortality rate in Southeast Asia.[1]

Health services that contribute directly to reducing MMR are health services during pregnancy or antenatal care, which are mostly carried out by village midwives. This condition shows that the performance of village midwives who are the spearhead of antenatal services is also still not good. Many factors that can influence the performance of village midwives include leadership style, domicile, and organisational culture. Organisational culture is widely known as the foundation of management systems and activities in every organisation. One organizational culture is the distance of power which is an important part of the superior-subordinate relationship.[2]

This data based on the 2015 Hulu Sungai Tengah District Health Office has changed, namely that the

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coverage of antenatal services increased but was still below the target of 75%. This figure is still below the average number for South Kalimantan Province, which is 81.02% and the average number for the national is 87.48%. Based on the data it is also known that as many as 41 villages from 206 villages (19.90%) do not have village midwives, especially for mountainous areas and are very isolated.

MATERIALS AND METHOD

This type of research is analytic observational with the cross-sectional approach. The population in this study were all village midwives in the working area of the public health centre in the Hulu Sungai Tengah District, totalling 200 village midwives with inclusion and exclusion criteria. Calculation of sample size by considering the proportion of precision calculated by the formula:

$$n = \frac{Z^2_{1-\alpha/2} P(1-p)}{d^2}$$

Information :

n: large sample

P: the proportion of ANC performance = 47.4%

$Z_{1-\alpha/2}$ with a 95% confidence level = 1.96

d: precision is set (0.1)

So the sample size is 95 respondents. The sampling technique is a multistage random sampling technique (non-proportional random sampling). The dependent variable is power distance (Y). Independent variables are leadership style (X1), domicile (X2) influences between variables were tested using the chi-square test with α (0,05).

FINDINGS

The results showed that the characteristics of the coordinating midwife from the highest age were above 40 years, the most working time was above 20 years, the highest level of education was a diploma three.

Table 1. Power Distance, Leadership Style, Domicile of Midwife Coordinator and Village Midwife in Hulu Sungai Tengah District 2017

Variable	Amount	Percentage (%)
Power distance between coordinator and village midwife		
Low	79	83.20
High	16	16.80
The leadership style of midwife coordinator		
Autocratic	34	35.79
Democratic	61	64.21
Laisses Faire	0	0
Domicile of the village midwife		
External target villages	15	15.79
Internal guided villages	80	84.21

Table 2. Crosstab Table Leadership Style and Domicile with Power Distance of Midwife Coordinator and Village Midwife in Hulu Sungai Tengah District 2017

Variable	Power Distance				Total (%)	ρ
	Low		High			
	Amount	%	Amount	%		
Leadership Style						
Autocratic	27	79.40	7	20.60	100	0.466
Democratic	52	85.20	9	14.80	100	
Domisili						
External	11	73.30	4	26.70	100	0.268
Internal	68	85.00	12	15.00	100	

Table 2 shows that midwife coordinators with democratic leadership styles tend to show low power distance. The autocratic leadership style applied by the midwife coordinators tends to show a high power distance. Village midwives who live in the target villages tend to show the power distance between the midwife coordinators and the low village midwives. Village midwives who live outside the target villages tend to show the distance of power between the midwife coordinators and the high village midwives.

DISCUSSION

The Effect of Midwife Coordinator's Leadership Style on Power Distance Between Midwife Coordinator and Village Midwife

Power distance also depends on the emotional closeness between superiors and subordinates, so that even though the power distance is high but psychologically there is emotional closeness such as friendship or family resulting in employees remaining comfortable to interact with their superiors. So that any leadership style applied does not affect the distance of power between the boss and the subordinate.

This opinion refers to the theory stating that leadership comes from power in a group or organization that consists of three types, namely position, personality, and politics.3

This opinion refers to the theory stating that leadership comes from power in a group or organization that consists of three types, namely position, personality, and politics.3

1. The power that comes from a position

a. Formal or legal power

Including the commander of the army, agency heads, presidents or prime ministers, and so on chances, power as appointed or confirmed by the official rules or regulations.

b. Control over resources and rewards

Employers who pay their employees, rice field owners who pay their workers, chiefs or offices that can reward members or subordinates, lead based on this type of power.

c. Control over punishment

Rewards are usually related to punishment. A leadership whose only source of control is punishment based on fear. For example, thugs who collect taxes from shop owners.

d. Control over information

People who master information can be leaders. For example, scholars become leaders in religion; scientists become leaders in science.

e. Ecological control

This source of power is also called the engineering of the situation. For example, control over job placement, a supervisor of the head of the personnel section has power over his subordinates by determining the position of its members.

2. The power that is based on personality

Leadership that comes from power because personality begins from personal nature, namely:

a. Skills

For example, in prayer in congregation in the religion of Islam which is used as a prayer leader or priest is the most fluent in reading the verses of the Qur'an.

b. Friendship and Loyalty

The nature of socializing, being loyal or loyal to a group is a source of power so that someone is considered a leader.

c. Charisma

The personality traits that lead to the personal authority of the leader are one of the sources of power in the leadership process.

3. The power from politics. Power derived from politics consisting of:

a. Control or decision-making process

An example of a judge presiding over a trial of justice is because he has control over the course of the trial and the decision or verdict to be handed down.

b. Coalition

Leadership by the source of political power is determined by the right or authority to make cooperation with other groups.

c. Participation

The leader regulates participation and in what form the members participate.

d. Institutionalization

For example, the religious leader marries a husband and wife determines the formation of a

new family, and a notary or judge establishes the establishment of a new foundation or company.

Another thing that can cause the coordinating midwife to apply more democratic leadership style, if analyzed from the characteristics of respondents is because the average age is relatively the same between coordinator midwives and most of the village midwives, so that mutual respect and respect are more dominant. The democratic leadership style also allows communication between superior and subordinate, then it can motivate the involvement of village midwife in all antenatal care program becomes high.[4]

The Influence of Village Midwife Domicile Against the Distance of Power between Midwife Coordinator and Village Midwife

Frequent interactions can play an important role in the formation of closeness and friendship groups. Interaction is the main requirement in group dynamics because with interaction there will be a process of knowledge transfer that can run horizontally based on the need for information about that knowledge. So that the closeness can contribute to the distance of power between the two people who interact.

Authority of the midwife as contained in the Regulation of the Health Minister of the Republic of Indonesia Number 97 of 2014 concerning Health Services Period Pra-pregnancy, Pregnancy, Childbirth, and Period After Childbirth, Organizing Contraception Services, and Sexual Health Services. The authority of the village midwife in antenatal care anywhere is based on the regulation there is no difference.5 To achieve good performance can be pursued through a high job involvement without being influenced by the village midwife domicile, but the village midwife domicile in the assisted village has a role in increasing the high job involvement.[6]

CONCLUSION

The distance of the power of coordinator and village mildwife not significantly affected by the coordinator leadership style and domicile in the implementation of services health.

Ethical Clearance: Before conducting the data retrieval, the researchers conducted a decent test of ethics conducted at the Faculty of Medicine, Lambung Mangkurat University to determine that this study has met the feasibility. Information on an ethical test that the study is eligible to continue. The feasibility of the research was conducted in an effort to protect the human rights and security of research subjects.

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REFERENCES

1. Ministry of Health Republic of Indonesia. Strategic Plan of the Ministry of Health Year 2015-2019. Jakarta. 2015.
2. Ministry of Health Republic of Indonesia. Guidelines for Assessment of Performance of Public Health Center. Director General of Public Health Development, Jakarta. 2006.
3. Raven B. The Bases of Power and Power/Interaction Model of Interpersonal Influence Against Employee Performance. Analyzes of Social Issues and Public Policy, 2008. 8(1) p.1-22.
4. Arifin S., Suhariadi F., and Damayanti NA. The Influence of Leadership Style of Midwife Coordinator toward the Performance of Village Midwives on Antenatal Care through the Job Involvement. Indian Journal of Public Health Research & Development, 2018 9(1), p.249-252.
5. Ministry of Health Republic of Indonesia. Minister of Health Regulation No.75 of 2014 concerning Community Health Centers. Jakarta. 2014.
6. Arifin S., Suhariadi F., and Damayanti, NA. The Role of Domicile on the Achievement of Village Midwife Performances in Antenatal Care through a Job Involvement. Indian Journal of Public Health Research & Development, 2018 9(1), p.258-262.

Qualitative Study: A History of Stunting in the Massenrempulu Community of Enrekang District

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ABSTRACT

Focus Group Discussion (FGD) method. FGDs were performed with primary children caregivers aged 0 to 24 months. Each of three FGD had 4 participants. FGD were conducted using structured interview guides and recorded tapes. Recorded data were transcribed and analyzed using qualitative thematic analysis techniques. Results : All participants are women, majority as housewives who sometimes help farm husbands and have at least one child in the age group 0-24 months in their home. The findings suggest that short body conditions or stunting are not considered a problem by the local community. The concept of the body that is considered important is capable of activity with normal and productive. People also feel resigned if their child's body stunting because according to them it is a gift from the Creator and should be grateful. Conclusion : The unique cultural element of each ethnic in itself has a value that affects the life of the local community. This is a local context that is often overlooked in the formulation of a policy that is often applied generically same for the whole of Indonesia. Different viewpoints between the government and Massenrempulu community could be a strong factor causing trend of stunting case to be increase every year.

***Keywords**: Stunting, children caregivers, Massenrempulu community.*

INTRODUCTION

Stunting is a failure to grow in children under five (infants under five years) due to chronic malnutrition so that the child is too short for his age. Nutritional deficiency occurs since the baby is in the womb and in the early period after the baby is born however, the new stunting condition appears after the 2 year old baby(1).

In Indonesia, around 37% (almost 9 million) of children under five experience stunting (Basic Health Research / Riskesdas 2013) and around the world, Indonesia is a country with the fifth largest prevalence of stunting. Even the prevalence of short toddlers was found to be higher in a number of conditions, including being 42.8 percent of mothers who married young (aged 15-19 years) and 46.7 percent of mothers who were short (height less than 150 cm)(2).

Stunting is not just a short body problem. Stunting is a chronic nutritional problem starting from the fetus in the womb until the child reaches the age of two years. The cause of stunting problems is multidimensional, not limited to nutrition and health issues. UNICEF has published the causes of malnutrition in children under five covering economic and socio-cultural causes, and recognizes three levels of causality that are related to children's nutritional status factors, namely indirect factors and the main factors as the direct cause of stunting. There are two direct causative factors that affect an individual's nutritional status, namely food factors and infectious diseases, these two factors influence each other. Malnutrition causes children to be susceptible to infection, because there is a disturbance in the child's immune system, whereas children who are repeatedly infected with the disease will worsen their nutritional condition(3,4).

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The problem of stunting in toddlers is very closely related to parenting issues. The concept of parenting as a determinant. The concept of parenting as a determinant of child nutrition is a new thing for those who work outside the field of nutrition and health. In addition, for those who work in the field, ways of measuring parenting are a problem because parenting knowledge and practice vary greatly from one culture to another[4]. Some studies have found that mothers with good parenting. Parenting is a practice in the household that is seen by the availability of food and health care and other sources for the benefit of life, growth and development. Parenting includes many aspects, namely maternal care, breastfeeding and complementary feeding, psychosocial care and cognitive stimulation, food storage and storage, health service search patterns and environmental hygiene and sanitation practices [4,5].

Feeding Babies and Children is an important part of parenting in accordance with the concepts and indicators launched by WHO (2012)[6]. From some research results found the incidence of stunting children, among others, due to improper feeding practices, in accordance with health recommendations, especially in terms of patterns of breastfeeding and complementary feeding. The UNICEF Indonesia study revealed a number of obstacles, especially knowledge barriers at the family level that triggered high incidence of stunting in children aged 6-23. Enrekang District including the two districts with the highest prevalence of stunting under five. The prevalence of stunting toddlers in Enrekang District does not occur evenly across all districts. Some districts show relatively high numbers compared to others. One sub-district that has a high prevalence is Baraka District, while the other regions show relatively low numbers, for example Baroko District and Enrekang City[7,8].

Based on several considerations that have been described previously, the researchers are interested in examining the study of stunting in the view of the Massenrempulu community and looking more closely at the submission of the Massenrempulu community with a stunting body pattern over time in a long period of time.

MATERIAL AND METHOD

Data collection uses a method of Focus Group Discussion (FGD). FGDs are conducted with primary caregivers from children aged 0 to 24 months. Each of the three focus group discussions has 4 participants. Focus group discussions were carried out using structured interview guides and recorded.

The instruments needed include recording devices, log books, and FGD guidelines[9,10].

Research design

This research is a qualitative research with phenomenology study design. The research was conducted in Pepandungan village, Baraka sub-district, Enrekang Regency. The study was conducted in November 2017 to February 2018.

Population and Informant

The population in this study were all mothers from baduta who were stunted and domiciled in Baraka sub-district, Enrekang district in the language of thorns. The large sample of the study were mothers with a million who experienced stunting and were willing to work together and actively participate in the study in the village of Pepandungan as many as 12 mothers.

Data collection

This study uses qualitative methods with a phenomenological approach. The phenomenological approach is about to see what is experienced by humans from the point of view of the first person, namely from the person who experienced it. The focus of phenomenology study is not a particular experience, but rather the structure of the experience of consciousness in the form of objective reality which is tangible in the subjective experience of people. The main study of the phenomenological approach is the subjective meaning of objective reality in the consciousness of people who undergo daily activities [12].

Data analysis

The recorded data is then transcribed and analyzed using qualitative thematic analysis techniques

FINDINGS

The concept of Massenrempulu culture is very broad regarding various parts of the life of its people. In the Massenrempulu community, giving parents great attention and affection to their children can be seen from the needs considered primary. The main things that are considered important and crucial for the future of their children. In the Massenrempulu culture, there

is the term 'inheritance' which shows parents' love for their children. Inheritance which is generally considered important to be abandoned for their children is buffalo, houses and land.

Based on the FGD that has been carried out, information is obtained regarding the inefficiency of public facilities perceived by informants that directly and indirectly affect the nutritional status of the local community.

CONCLUSIONS AND RECOMMENDATIONS

Road facilities to reach the research location are fairly difficult. When traveling to the research location, the research team had to go through a rocky and muddy road with a fairly narrow road width. Not surprisingly, during the trip, the research team only ran into a number of motorbikes and truck cars. Every now and then, the trip must stop to repair the road first, such as picking up rocks to cover uneven roads to prevent the car from being used down. Along the way from the main highway to the location of the study, it was traversed by the mountain edge on the left and the steep ravine at the right side without the edge barrier. The available road width also makes it impossible to pass a car, even with a motorcycle it is quite difficult. When going to bump into a truck, the truck driver always relents to retreat until he reaches the cornering road, because the width of the road is more likely to cross the point. To drive a car on this road must certainly require good driving skills with a high level of concentration.

From the main highway to the location of the study, the research team passed several points of the area by using the community to settle. However, the distance between one settlement point and another is quite far. Time needed to reach the research location is also quite long, which is around two and a half hours. The length of time needed to get to the location of the study was not only felt by the research team. This was also revealed by the informants when the FGD was held. "Mabela male lako, eda know male pabawa sa mabelai" (abbreviation Sh, Fw, and Dn).

The informant revealed that the distance that must be traveled to the capital of the sub-district is very far, it takes a long time, and is constrained by vehicles. This is also the reason that people rarely access the market in the sub-district, even though there are no market facilities in the village or local hamlet.

The level of health in the local area is more viewed by one's productivity. For adolescents and adults, a healthy concept is more emphasized on their work productivity. Strengthened by the demands of a life that truly depends on nature and agriculture being the highest source of income in the region, eating ability to work is needed. During this time, they believed that body proportions did not affect their productivity at work.

The government in this case also certainly plays an important role, especially for health and nutrition workers. Giving insight and information for mothers. very important in improving the quality of future generations. The support of the main community and the government is generally a very important point in carrying out various kinds of appeals and interventions. Especially for people who live in remote areas with a culture that is still closely attached. It is also realized from the research that has been done, that the concept of stunting itself is the main role in creating a generation or child who is stunting.

DISCUSSION

So that a short body is not considered a problem that must be troubled, so there are no steps taken to handle the condition.

Household life in the study area which also shows the independence setting also contributes separately in terms of food fulfillment at the household level. Marriage at an early age is common in this area. Even four of the FGD participants who were mothers of children under five were aged ≤20 years. And 2 of the FGD participants admitted that their husbands were still in college in another city when the research was conducted. However, the independence setting that grows and develops in this area makes everyone who has married feel proud to live with his parents again. So that only three FGD participants stated that they lived with their parents-in-law because their parents-in-law were old and needed child care.

Setting independence makes young couples feel they have to fulfill their daily needs independently. So, even though the food at the household level has been depleted, they are very reluctant to ask for help from their parents[11]. The principle is that there is enough or insufficient supply of food for daily needs

to be a household level consequence. Settings like this are certainly very influential in terms of providing materials and ultimately play a role in meeting the daily nutritional needs needed, especially for children. Advanced manifestations of this condition certainly lead to stunting due to intake that is not in accordance with daily consumption recommendations.

Not only is the setting independent, the concept of body proportions which is a divine gift that must always be grateful for the pattern of reinforcement of stunting in the area of research. Height is considered something that has been determined by the Almighty, and it is appropriate for humans to be smart to be grateful for what they have. The belief that height is strongly influenced by heredity, further strengthens the pattern of being grateful for what is owned today. This concept of sincerity or resignation is placed not in its place, because in fact at the age of the child, growth is still very likely to be pursued. And the belief that short is a hereditary factor is a concept that must be broken in the mindset of society. Incorrect trust and a sense of resignation are two things that make mothers do not have the will to do something in the pursuit of child development.

CONCLUSION

A short body or stunting is considered not a problem by the Massenrempulu community. In everyday life, health and body strength are assessed in work productivity. So, if someone is still able to work optimally, short posture is not a problem. For children, a stunting body is also not a problem as long as the child is still able to play and active activities. The perspective of the Massenrempulu community does indeed support the occurrence of prolonged stunting in the region. This fact shows the importance of serious attention from the government to reduce the prevalence of stunting at the age of children to improve the quality of human resources in the future.

Logical & valid derivatives of the findings. Is the answer to the research problem. Made based on facts. Is a statement of the will of the author. Demonstrate the things that need to be developed.

Conflict-of-Interest Statement: There is no conflict of interest between researchers and informants and key informants.

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Ethical Clearance : Ethical research was obtained after going through ethical studies in front of reviewers in the ethics commission for research on Faculty of Public Health at Airlangga University in Surabaya, Indonesia.

REFERENCES

1. Team-National-Acceleration-Poverty-Reduction, 100 District / City Prioriras for Intervention of Dwarf Children (Stunting) Volume I (Internet). Deputy Secretariat of the Republic of Indonesia: Central Jakarta; 2017 [cited 2018 April 03]. Available from: www.tnp2k.go.id/images/uploads/downloads/Binder_Volume1-1.pdf
2. National Development Planning Agency, 2011-2015 National Food and Nutrition Action Plan, National Development Planning Agency: Jakarta; 2011. [cited 2018 Feb 24]. Available from: https://www.bappenas.go.id/id/.../rencana-aksi-nasional-pangan-dan-gizi-2011-2015/
3. UNICEF, cauSeS and conSequenceS of Stunting: An Opportunity to Improve Health and Economic Development, UNICEF, Editor. UNICEf: Geneva; 2012 [cited 2018 Feb 21]. Available from: https://www.unicef.org/nutrition/.
4. Engle, P.L., P. Menon, and L. Haddad. Care and Nutrition : Concept and Measurement, Washington D.C: International Food Policy Research Institute [Internet]. 1997 [cited 2018 Mar 08]. Available from: www.ifpri.org/.../care-and-nutrition-concepts-and-measurem.
5. Schulz, R. and J. Eden, Family Caregiving Roles and Impacts. Committee on Family Caregiving for Older Adults; Board on Health Care Services; Health and Medicine Division; National Academies of Sciences, Engineering, and Medicine. Families Caring for an Aging America [Internet]. 2016 [cited 2018 April 12]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK396401/.
6. WHO and UNICEF, Level & Trends In Child Malnutrition. WHO and UNICEF: Geneva [Internet]. 2012 [cited 2018 Mei 21]. Available from: http://www.who.int/nutgrowthdb/estimates/en/.
7. South Sulawesi, DI. Nice Project Regional Nutrition Status Monitoring Report 2012, South Sulawesi Provincial Health Office: South Sulawesi; 2013.

8. South Sulawesi, D., South Sulawesi Province Health Profile, South Sulawesi Provincial Health Office: South Sulawesi; 2015.
9. UNICEF, The State of The World's Children ; A Fair Chance for Every Child. 2016, United Nations Children's Fund: New York [Internet]. 2016 [cited 2018 Mei 11]. Available from: https://www.unicef.org/publications/files/UNICEF_SOWC_2016.pdf.
10. de Onis, M. and F. Branca, Childhood stunting: a global perspective. Maternal & Child Nutrition, 12; 2016 [cited 2018 mei 21] 12-26 p. available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5084763/.
11. Stewart, C.P., et al., Contextualising Complementary Feeding In A Broader Framework For Stunting Prevention. Maternal and Child Nutrition. 9(2); 2013 [cited 2018 Mar 9]. 27-45 p. available form: https://escholarship.org/content/qt1g0576j2/qt1g0576j2.pdf.
12. Langdridge Darren Phenomenological Psychology: Theory, Research, and Method. Pearson Education; 2007 [cited 2018 April 12]. Available from:https://www.amazon.com/Phenomenological-Psychology-Th...

The Effect of Rosella Beverage Intervention on Lipid Profiles and Antropometric in Obese Adult Men

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ABSTRACT

This study aimed to analyze the effect of rosella beverage intervention toward blood lipid profiles (total cholesterol, triglycerides, HDL and LDL) and antropometric in obese adult men. The current study was a quasi experimental study with pre-post test. Twentyfive obese men subjects in IPB Security Unit were randomly assigned to a control group (n = 11) and intervention group (n = 14). The intervention group consumed a rosela beverage containing anthocyanin 81.16 mg/g and the control group consumed a placebo beverage that did not contain anthocyanin for 6 weeks. Rosella beverage has contained anthocyanin 81.16 mg/g and antioxidant activity 64.8 mg vitamin C/100 g. The results showed that the presence of interference could effectively reduce weight, body weight and BMI compared to before intervention ($p<0.05$). Intervention beverageing roselle significantly decreased triglyceride levels ($p<0.05$) and tend to decrease cholesterol, HDL and LDL ($p> 0.05$). This indicates that the intervention of roselle beverages could improved the lipid profile in obese adults.

Keywords*: anthocyanin, obesity, rosella beverage*

INTRODUCTION

World Health Organization (WHO) estimates that around 1.6 billion adults are overweight and 650 million are obese in 2016. The prevalence of overweight and obesity in Indonesia from year to year has increased as shown by the Riskesdas data in 2007, 2010 to 2013 were respectively 19.1%, 21.7%, and 26.3%. Obesity, particularly central obesity, is a condition of excess fat accumulation in adipose tissue. which has numerous negative impacts for health. Central obesity, featured by abdominal fat accumulation, increases the risk of cardiovascular disease compared to general obesity[1]. Central obesity increases the risk of cardiovascular disease concomitant of increasing blood lipid profiles such as cholesterol, triglycerides, Low Density Lipoprotein (LDL), and Low High Density Lipoprotein (HDL)[2].

Anthocyanin is one of flavanoid that has purple colour and often found in fruits, vegetables and tubers. Previous meta-analysis studies suggested that anthocyanin consumption has health benefits, one of which improves lipid profile for healthy people and people with cardiovascular disease[3-6]. The role of anthocyanin in improving lipid profiles is by suppressing the enzyme regulation of HMG-CoA reductase, thus inhibiting cholesterol synthesis[4].

Rosella flower is a plant containing 128.76 mg / 100g anthocyanin[7]. Rosella flowers are often consumed by people as a rosella tea. Azis *et al*.[8] reviewed several research results related to the intervention of rosella against lipid profiles for individuals who have cardiovascular disease but most of them made rosella as tea and capsule product. However, there are still not many research that made beverage from extract rosella as functional food to see the effect on lipid profiles in obese individuals. Functional food has advantages more easily accepted and safe than capsules. Therefore, roselle extract beverage products are made to increase the acceptability and effectiveness of lipid profile improvement in obese individuals.

The objectives of this study were to make high antosianin rosella beverage formulations and to analyze the effect of rosella beverage toward blood lipid profiles (total cholesterol, triglycerides, HDL and LDL) in obese men.

MATERIAL AND METHOD

The design of the intervention study was quacy experimental pre-post design which divided by control and intervention groups in March until May 2018. The location of this study was chosen purposively ini Bogor Agricultural University. The subjects were 25 male security guard from Bogor Agricultural University. This subject consitsted of 11 for the control groups and 14 for the intervention groups. Inclusion criteria in this study were men who were overweight/obese with a BMI value ≥ 23 kg/m2 and/or waist circumference >90cm, aged 30-55 years, were not getting similar interventions (antioxidant beverages). Exclusion criteria in this study were having chronic disease or cardiovascular disease, having a disease or history of gastric disease, consuming alcohol, routinely taking antioxidant supplements and/or phytopharmaca, taking anti-hypercholesterolemia drugs.

The intervention group was given roselle beverage containing anthocyanin 81.16 mg/day for 6 weeks, while the control group was given placebo beverages that had the same color as the intervention product but did not contain anthocyanin. All groups were given 480 mL/day beverages. During the intervention period, the subject was asked not to consume high-food antioxidants, especially anthocyanins, and supplements or multivitamins.

The collected data includeds secondary and primary data. Secondary data was the profile of IPB security guard obtained from staff department of the Campus Security Unit (UKK) of IPB. Primary data includede organoleptic, socioeconomic characteristics, anthropometry and blood lipid profiles. Organoleptic data consists of hedonic and hedonic quality tests. Data of socioeconomic characteristics include of age, education, income and family size. These data were taken by direct interview to the subject. Anthropometric data included of weight, height, and waist circumference. Subjects used light clothing and barefoot during anthropometric measurements. Data of subject characteristics, socioeconomic, anthropometric and lipid profiles were collected at the beginning and the end of the study. The consumption of roselle beverages was monitored by compliance form filled by the subject and confirmed by the researcher.

The data on socio-economic characteristics of the subjects were analyzed descriptively. The distribution of anthropometric data and lipid profiles were analyzed by Kolmogorov-Smirnov test. The comparison of levels of blood lipid profiles and anthropometry for intra-group comparison (baseline with endline) were analyzed by paired t-test, while inter-group comparison (between intervention and control groups) was analyzed by independent t-test. The ANCOVA test was used to determine the effect of rosella beverage intervention by controlling covariate variables.

RESULTS

Table 1: Characteristics subject in baseline of the study

Variable	Group		p-value
	Control		
Age (th)	46.2 ± 5.0	42.6 ± 6.0	0.130[1]
Early adultl	2 (18.2)	4 (28.6)	
Middle adult	9 (81.8)	10 (71.4)	
Education			0.366[2]
Junior High School	0 (0.0)	1 (7.1)	
Primary High School	11 (100.0)	13 (92.9)	
Family size (people)			0.420[1]
≤4 people	8 (72.7)	12 (85.7)	
5-6 people	3 (27.3)	2 (14.3)	
Income (Rp)			0.233[2]
Low: <1.500.000/ month	0 (0.0)	1 (7.1)	
Moderate: 1.500.000-2.500.000/month	6 (54.6)	5 (35.7)	
Anthropometrics			
Waist circumference (cm)	93.23 ± 5.50	96.29 ± 8.86	0.327[1]
Weight (kg)	77.01 ± 6.36	78.81 ± 8.73	0.572[1]
BMI (kg/m^2)	28.02 ± 2.48	28.62 ± 2.35	0.547[1]
Lipid profiles (mg/ dL)			
Cholesterol	209.09 ± 22.40	180.00 ± 46.16	0.068[1]
Trigliserida	147.45 ± 46.77	150.29 ± 22.97	0.923[1]
HDL	54.09 ± 13.45	45.36 ± 14.36	0.134[1]
LDL	125.45 ± 24.03	104.64 ± 40.71	0.148[1]

1 Independent t-test

2 Chi-square

Table 1 describes the characteristics of all subjects. Most subjects were classified as middle adults with an average age of 46.2±5.0 (control group) and 42.6±6.0 (intervention group). The final education level of the subjects is mostly high school graduates and has a family size of ≤4 people. Subjects had an average income with a range of 1 500 000 - 2 5 000 000/month which is classified as moderate economic level. Based on the results of different test analysis, there were no significant differences age, education, family size, income, anthropometrics and lipid profiles between intervention and control group at the baseline of study ($p>0.05$).

Table 2: Results of statistical analysis of different test anthropometric variables

Variable	Phase	Control	Intervention	p-value[2]
Waist Circumference	Before	93.23 ± 5.50	96.29 ± 8.86	
	After	90.64 ± 5.56	93.21 ± 7.79	
	Δ Mean	-2.59	-3.08	0.632
	p-value[1]	0.005*	0.000*	
Weight	Before	77.01 ± 6.36	78.81 ± 8.73	
	After	77.04 ± 6.45	78.04 ± 8.75	
	Δ Mean	0.03	-0.77	0.130
	p-value[1]	0.962	0.013*	
BMI	Before	28.02 ± 2.48	28.62 ± 2.35	
	After	28.03 ± 2.46	28.33 ± 2.38	
	Δ Mean	0.01	-0.29	0.133
	p-value[1]	0.991	0.011*	

*significant $p<0.05$

[1] Paired t-test ($P <0.05$ = significant difference in intra-group)

[2] Independent t-test ($P <0.05$ = significant difference between groups)

All groups experienced a decrease in waist circumference and were significantly different after intervention ($p<0.05$). Intervention groups experienced a significant weight loss ($p<0.05$) and BMI. meanwhile, the control group tends to experience a weight gain and BMI ($p>0.05$).

Table 3: Results of statistical analysis of different test lipid profiles

Lipid Profile	Phase	Control	Intervention	p-value[2]
Cholesterol	Before	209.09 ± 22.40	180.00 ± 46.16	
	After	203.73 ± 26.46	173.29 ± 47.82	
	Δ Mean	-5.36	-6.71	0.835
	p-value[1]	0.346	0.100	
Triglyseride	Before	147.45 ± 46.77	150.29 ± 22.97	

Cont... **Table 3: Results of statistical analysis of different test lipid profiles**

	After	158.82 ± 71.04	128.79 ± 17.84	
	Δ Mean	11.37	-21.50	0.050*
	p-value[1]	0.414	0.038*	
HDL	Before	54.09 ± 13.45	45.36 ± 14.36	
	After	43.45 ± 6.12	44.64 ± 9.33	
	Δ Mean	-10.64	-0.72	0.740
	p-value[1]	0.020*	0.854	
LDL	Before	125.45 ± 24.03	104.64 ± 40.71	
	After	126.73 ± 21.55	103.57 ± 39.81	
	Δ Mean	1.28	-1.07	0.807
	p-value[1]	0.868	0.861	

*significant p<0.05

[1] Paired t-test (P <0.05 = significant difference in intra-group)

[2] Independent t-test (P <0.05 = significant difference between groups)

The result of analysis show that triglyserida level significant decreased in intervention group compared to control group. Futhermore, the other lipid such as cholesterol, LDL and HDL no significant difference between group control and intervention (p>0.05).

DISCUSSION

Rosella beverage was made from roselle extract, water, sukralosa and salt. The beverages that were intervened were selected rosella beverages based on organoleptic tests. This beverage contains 10 g of rosela extract. The anthocyanin content in roselle beverages was 81.16 mg. Anthocyanin is part of flavonoids, considered as an antioxidant, which gives red or purple color to plants[9]. The types of anthocyanins found in rosella were delphinidin-3-glucoside, cyanidin-3-glucoside, delphinidin-3-sambubioside and cyanidin-3-sambubioside, all of which contribute to antioxidant activity[10]. Based on the analysis, the antioxidant content of roselle beverage were 64.8 mg vit C/100 g. The antioxidant content of this rosella beverage is higher than other antioxidant beverages such as bran beverages which have an AEAC value of 28.74 mg vit C/100 g[11] and jelly okra beverages with an AEAC value of 10.10 mg vit C/100g[12]. Djaeni *et al.*[13] states that rosella is a plant that has strong antioxidants with IC50 values between 50-100 ppm.

The results of this study found that giving of roselle beverage significantly reduced waist circumference, body weight and BMI compared to before intervention (p<0.05). This result is consistent with the research which proved that 1g/day roselle extract for 90 days could reduce BMI and body weight by 0.4 1g/day and 0.8 kg[14]. Several studies in Mexico have concluded the use of roselle extract in weight loss because of its ability to excrete fat absorption and body weight in mice[15]. Rosela contains high antioxidants, one of which is anthocyanin. Previous meta-analysis stated that anthocyanin supplementation can reduce weight and adipose tissue in both animal and human subjects[16].

The study also found that the intervention group significantly reduced triglycerides compared to the control group (p<0.05). Meanwhile for other lipid profiles such as cholesterol, LDL and HDL tend to decrease in the intervention group (p>0.05). The occurrence of triglyceride decrease in the intervention subjects was suspected because the anthocyanin content of roselle beverage were 81.16 mg. The role of anthocyanin in reducing triglycerides is by decreasing serum apo-B and

apo-C III. Both serum plays a role in the metabolism of triglycerides to the plasma[4].

HDL is one of the lipid profiles that are protective against atherosclerosis. Increased cholesterol levels had a positive effect on reducing the risk of non-communicable diseases[17]. The results of this study indicated that there was a decrease in HDL levels in each group, but still within the normal range of 35-55 mg/dL[18]. The HDL in the intervention group decreased by 0.72 mg/dL (1.6%), but not significant ($p > 0.05$). The control group also significant decreased by 10.64 mg/dL (19.7%) compared to the data before intervention ($p<0.05$). Increasing HDL level is difficult in several clinical studies, one of which is caused by the subject's lifestyle that hascan not changed such as lack of physical activity. Although, subjects were given education to increase physical activity and to eat healthy foods, during the study, not all subjects were disciplined, due to age and work pattern as security guards who had not been able to perform physical activities regularly.

Rosella contains anthocyanins which can play a role in reducing LDL by inhibiting cholesteryl ester transfer protein (CETP)[4]. Decreased LDL levels may also be due to the inhibition of triacylglycerol synthesis by hibiscus acid compounds which are the content of rosella[15]. Meanwhile, the consumption of 160 mg anthocyanin supplementation twice daily for 24 weeks in subjects with diabetes mellitus 2 significantly reduced LDL levels (7.9%), triglycerides (23.0%) and increased HDL levels (19.4%) compared to the control group19. The difference in outcomes was due to several factors: the type and number of subjects (healthy subjects or sick subjects), length of study, and number of intervention products. Anthocyanin has a low bioavailability about 12%[20]. Bioavailability is the ability of active ingredients that can be absorbed by the body. Therefore, anthocyanin intervention should be given in large quantities in order to be absorbed more by the body.

Base on the ANCOVA test, changes in lipid profile levels were not influenced by several covariate variables such as energy and nutrients intake, levels of lipid profiles before intervention and frequency of fried foods. This indicates that the improvement of the lipid profile in the intervention group was thought to be only affected by the intervention of roselle beverage.

CONCLUSION

Intervention of rosella beverage significant decreased trigliserida level, but there was tendency to decreased kolesterol, LDL and HDL level. The intervention of rosella beverage alto significant decreased waist circumference, weight and BMI.

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REFERENCES

1. Simbar M, Pandelaki K, Wongkar MCP. Hubungan lingkar pinggang dengan profil lipid pada pasien diabetes melitus tipe 2. Jurnal e-Clinic (eCl) 2015; 3(1) 12-15.
2. Klop B, Jan WF, Elte and Manuel CC. Dyslipidemia in obesity: mechanisms and potential targets. Nutrients 2013: 5(4): 1218–1240
3. Huang H, Chen G, Liao D, Zhu Y, Xue X. Effects of berries consumption on cardiovascular risk factors: a meta-analysis with trial sequential analysis of randomized controlled. Scientific Reports 2016; 6(23625):1-11.
4. Liu CF, Sun J and Bo Y. Effects of anthocyanin on serum lipids in Dyslipidemia patients: a systematic review and meta-analysis. PLoS ONE 2016; 11(9): e0162089.
5. Wallace TC, Slavin M, Frankefeld CL. Systematic review of anthocyanins and markers of cardiovascular disease. Nutrients 2016; 8(32):1-13.
6. Cassidy A. Berry anthocyanin intake and cardiovascular health. Molecular Aspects of Medicine 2017; 30(2017):1-7.
7. Suzery M, Lestari S, Cahyono B. Penentuan total antosiaiiin dari kslopak bunga rosela (Hibiscus sabdariffa L) dengan metode maserasi dan sokshletasi. JSM 2010; 18(1):1-6
8. Azis Z, Wong SY, Chong NJ. Effects of Hibiscus

sabdariffa L. On serum lipids:Asystemati creview and meta-analysis. Journal of Ethnopharmacology 2013; 150(2013): 442–450

9. Forbes-Hernández TY, Giampieri F, Gasparrini M, Mazzoni L, Quiles JL, Alvarez-Suarez JM, Battino M. The effects of bioactive compounds from plant foods on mitochondrial function: A focus on apoptotic mechanisms. Food Chem Toxicol 2014; 68 (2014): 154–182.
10. Jabeur I, Pereira E, Barros L, Calhelha RC, Sokovic M, Oliveira MBPP, Ferreira ICFR. Hibiscus sabdariffa L. as a source of nutrients, bioactive compounds and colouring agents. Food Research International 2017; 9969(17): 1-32.
11. Damayanthi E, Kustiyah L, Khalid M, Farizal H. Aktivitas antioksidan bekatul lebih tinggi daripada jus tomat dan penurunan aktivitas antioksidan serum setelah intervensi minuman kaya antioksidan. JGP 2010; 5(3): 205-210.
12. Nurmalia DR. Pengaruh rasio okra hijau dan stroberi terhadap aktivitas antioksidan, kandungan total fenol, dan sifat organoleptik minuman jeli [skripsi]. Bogor: Institut Pertanian Bogor, 2017. doi:Q
13. Djaeni M, Ariani N, Hidayat R, Utari FD. Ekstraksi Antosianin dari Kelopak Bunga Rosella (Hibiscus sabdariffa L.) Berbantu Ultrasonik: Tinjauan Aktivitas Antioksidan. Jurnal Aplikasi Teknologi Pangan 2017; 6 (3): 148-151
14. Kuriyan R, Kumar DR, Rajen R, Kurpad AV. An evaluation of the hypolipidemic effect of an extract of Hibiscus Sabdariffa leaves in hyperlipidemic Indians: a double blind, placebo controlled trial. BMC 2010; 10 (27): 1-8.
15. Carvajal-Zarrabal,O, Hayward-Jones, PM, Orta-Flores Z, Nolasco-Hipolito C, Barradas-Dermitz DM, Aguilar-Uscanga MG, Pedroza-Hernandez MF. Effect of Hibiscus sabdariffa L. dried calyx ethanol extract on fat absorption-excretion, and body weight implication in rats. Journal of Biomedicine and Biotechnology 2009; 2009 (1-5)
16. Azzini E, Giacometti J, Russo GL. Antiobesity effects of anthocyanins in preclinical and clinical studies. Oxidative Medicine and Cellular Longevity 2017; 2017 (2740364): 1-11
17. Navab M, Anantharamaiah GM, Reddy ST, Lenten BJV, Fogelman AM. HDL as a biomarker, potential therapeutic target, and therapy. Diabetes Journal 2009; 58(12):2711-2717.
18. Amrizal SN, Zakaria FR, Chasanah E, Suliantari. Intervensi tahu ungu mampu memperbaiki profil lipid darah subjek penderita diabetes melitus tipe-2. JGP 2017; 12(3):225-230
19. Li D, Zhang Y, Liu Y, Sun R, Xia M. Purified anthocyanin supplementation reduces dyslipidemia, enhances antioxidant capacity, and prevents insulin resistance in diabetic patients1–3. J Nutr 2015; 145(4):742-748.
20. Czank Z, Cassidy A, Zhang Q, Morrison DJ, Preston T, Kroon PA, Botting NP, Kay CD. Human metabolism and elimination of the anthocyanin, cyanidin-3-glucoside: a 13C-tracer study1–3. AJCN 2013; 2013 (97): 995–1003

Exposure of Xylene in Working Environment and Methylhippuric Acid in Informal Footwear Worker in Bogor, Indonesia

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ABSTRACT

Introduction: The use of adhesives and paints containing xylene play an important rule in footwear manufacturing. Xylene exposure can affect the central nervous system. To determine the level of exposure can be conducted by measuring the levels of methylhippuric acid (MHA) in urine. The aim of this study was to describe the risk of xylene exposure to workers' health.

Method: This study used cross-sectional design and conducted in three footwear workshops in Ciomas, Bogor Regency in September – October 2017. The study sample consisted of 40 urinary workers and 9-point measurements of xylene in indoor air. Especially, urine (MHA) was taken at the end of work hours and analyzed with UPLC MS/MS. Furthermore, xylene measurements were carried out using gas chromatography. For the analysis of the relationships between the concentration of xylene and MHA levels using simple linear regression.

Results: The concentration of xylene in the workshops was 0.00358 mg/m^3 (median) with the highest concentration at the sample point 6 (0.03161 mg/m^3). MHA in the urine of all workers was 0.000100 g/g of creatinine (median). From the statistical results, there was no statistically significant relationship between xylene concentration and MHA (p = 0,511).

Conclusions: There was a positive linear correlation between xylene concentration in indoor air of workplace increased and the level of MHA in urine. It means the higher the xylene concentration, the more MHA level.

Keywords: *xylene, methylhippuric acid (MHA), footwear worker, workplace, working environment*

INTRODUCTION

One of the volatile chemical compounds is xylene which source from adhesives and paints. Its presence in the footwear industry has proved in several studies. Xylene was detected in indoor air in footwear workshop in Pulogadung, Jakarta.[1] Similarly, the adhesive substance in footwear workshop in Cibaduyut, Bandung containing xylene solvent has found.[2] The types and brands of adhesives in Pulogadung and Cibaduyut with Ciomas do not vary as they have similar characteristics. In another medium, it also found in shoe polish products.[3] Accordingly, footwear workers are vulnerable to the exposure of xylene while working in footwear workshops. The pattern of their work activities directly contacts with harmful solvents. It will cause health problems later on.

Xylene enters to the human body through inhalation, ingestion, and absorption. Every individual has the distinct reactions of exposure level due to the amount

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of concentration and duration of exposure.[4] The effects of exposure to xylene are shortness of breath, impaired lung function, heart palpitations, chest pain, abnormal ECG, and possible kidney impairment.[5,6] Other effects of short or long term of high concentration are affecting the central nervous system in the form of subjective symptoms of poisoning, headache, fatigue, short-term memory disorder, time response disorder, disorder in numerical ability, and alteration in equilibrium and body balance.[5,7] Likewise, a case report in United Kingdom reported case of fatality in consequence of exposure to high Concentration of xylene in painting industry.[8] There was evidence that xylene generated oxidative stress and organelle damage in lymphocytes.[9]

Biological monitoring is a method used to assess the exposure level of the chemical agent by measuring the metabolite or reaction product in a tissue or body specimen. Xylene can be detected in the end-exhaled air (expiration), in blood, and urine in exposed individuals. However, urinary level of methylhippuric acid (MHA), a metabolism product of xylene, is far better to indicate an individual exposed to xylene than blood and exhaled air containing xylene.[4] In a study in Iran, MHA in urine had a good correlation with xylene in the indoor air.10 Hence, MHA has recommended as a biomarker for monitoring workers who exposed to xylene.[7,11] According to biological exposure index (BEI) of American Conference of Governmental Industrial Hygienists (ACGIH), the tolerable MHA is 1.5 g/g of creatinine.[12]

Until now, the use of the adhesive substance containing xylene solvent in the production process has still used because there is no a novel finding which can substitute existed material. Health problems, caused by exposure to xylene or other solvents, have not been a top priority to be addressed, especially in the informal sector. In fact, a vast range of studies has examined the health effects of xylene exposure and the magnitude of the risk. No matter how small the concentration of contaminants in the environment cumulatively can affect the health quality of workers and productivity of the footwear workshop. This study aimed to formulate risk control measures so that workers can work safely.

MATERIALS AND METHOD

This is a cross-sectional study and was carried out between September and October 2017. The sampling frame of the study was 68 workers from three footwear workshops which registered in the Ciomas Puskesmas (public health center). The sampling method was drawn by purposive sampling since the sampling had similar characteristics or conditions. All participants retrieved from worker list of the workshops.

Inclusion criteria for footwear workshop workers were following this: at least working time was one year and 16 years old; working at the workshop to produce footwear; not in good health during collecting data. Exclusion criteria included employees who worked in their home and urinary volume less than 5mL. Informed consent was taken from the participants ensuring their confidentiality and anonymity before data collection starting. Participants were eligible only 40 workers according to sample criteria.

Xylene concentration in indoor air conducted in 9-point measurements of air sampling, 3 points in each workshop. The collection of air sampling was carried out in every workshop workspace consisting of: 1. workshop A: a. upper and sewing area (point 1); b. Pattern and finishing area (point 2); c. Lower and gluing area (point 3), 2. Workshop B: a. Lower rear corner area (point 4); b. Gluing and lower area (point 5); c. Sewing, paint and finishing area (point 6), 3. Workshop C: a. Pattern and packaging area (point 7); b. Sewing area (point 8); c. Gluing and lower area (point 9). The duration of air sampling was 20 minutes by using the solid sorbent tube. All samples transferred to analyze in Jakarta Hiperkes laboratory with gas chromatography (GC) and carried out according to The National Institute for Occupational Safety and Health (NIOSH) 1501 method.[13] Every air and urine samples which collected from the workshops would label in alphabetical order.

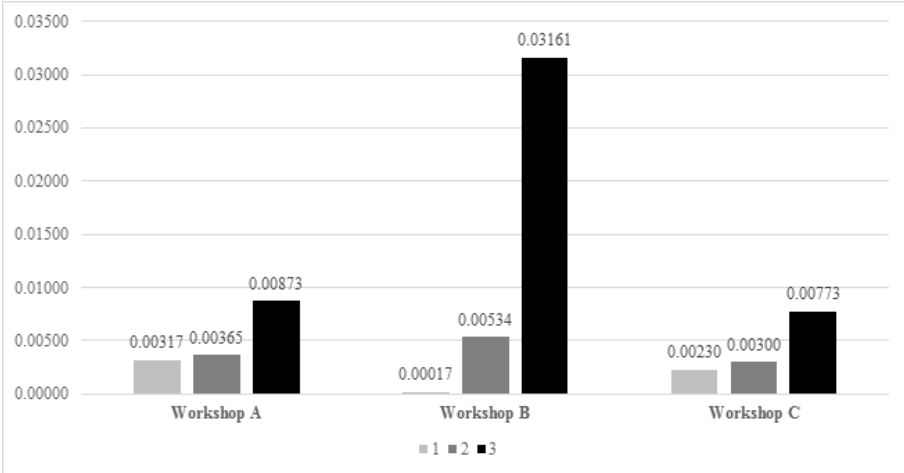
The urine samples collected in a urinary pot plastic, the minimum volume of 5 mL, bagged and refrigerated at the temperature of 4°C before storage in which they were stable until four weeks.[14] The determination of MHA and urinary creatinine carried out according to NIOSH 8301 method.[15]

Data analysis used simple regression linear to analyze the association between xylene concentration and MHA in urine. All the data were collected at the end of working hours for the worker's urine and the xylene concentration during the production process.

FINDINGS

Commonly, the workshop buildings did not have

workspace dividers except in the 'C' workshop which separated by the concrete wall. Every workshop produced different footwear products from each other. The 'A' workshop made casual shoes, the 'B' workshop made military boots and formal work shoes, and the 'C' workshop made women's shoes and sandals.



Graph 1. Xylene Concentration (mg/m^3) Based on the Air Sampling Point in Three Workshops

The presence of xylene was detected in all workshops and the value did not exceed the threshold limit value (TLV) in Indonesia of 434 mg/m^3 (Permenakertrans No. 13 of 2011 and SNI 19-0232-2005). The highest concentration of xylene was at the sampling point 3 (workshop B) of 0.03161 mg/m^3 (graph 1). At this point, there were two main activities, painting and gluing. This process did not do in other workshops because of the different production process. Previous studies in Pulogadung (Jakarta) and Cibaduyut (Bandung) verified the presence of xylene in glue and exposed to workers through inhalation.[1,2] Xylene in the paint is released through the evaporation process when spraying and the paint layer drying on the painted surface. Its presence, in paint besides adhesive, has been proven.[3,16] In another study, xylene from paint confirmed in the workspace.[17,18] and interviews were performed to observe the neuropsychological symptoms that may result from exposure to the solvents. The result showed that the average concentration for the exposed group of xylene in the paint company working environment was 2.7 (SD = 2.4 Also, thinner contained about 30-40% of xylene and mixed in the paint.[14] Thus, the xylene concentration was higher than the other sampling points in this study because there were two sources, paints and adhesives.

The average of MHA levels for all workers in the three workshops was 9.00E-05 g/g creatinine (table 1). The median value was 1.00E-04 g/g of creatinine. Workers in the workshop B had the highest average of value at 1.33E-04 g/g of creatinine compared with the worker in another workshop. Following that, the MHA level in the workshop A was 8.90E-05 g/g of creatinine. The lowest MHA level was workers in the workshop C at 6.80E-05 g/g of creatinine.

Table 1. The Distribution of Xylene (mg/m^3) and MHA (g/g kreatinin)

Workshops	**Mean**	**Median**	**SD**	**Min – Max**	***Skewness****
Xylene					
Workshop A	0.00518	0.00365	0.00364	0.00317 – 0.00873	1.376
Workshop B	0.01238	0.00534	0.01690	0.00017 – 0.03160	1.266
Workshop C	0.00434	0.00300	0.00295	0.00230 – 0.00773	1.327
Whole Workshop	0.00689	0.00358	0.00844	0.00017 – 0.03160	4.129

***Cont.*.. Table 1. The Distribution of Xylene (mg/m^3) and MHA (g/g kreatinin)**

MHA					
Workshop A	8.90E-05	1.00E-04	8.20E-05	3.00E-06 – 3.00E-04	0.968
Workshop B	1.33E-04	1.00E-04	7.10E-05	1.00E-04 – 3.00E-04	1.404
Workshop C	6.80E-05	7.50E-05	3.40E-05	1.00E-05 – 1.00E-04	-0.728
Whole Workshop	9.00E-05	1.00E-04	6.50E-05	3.00E-06 – 3.00E-04	4.653

*) Skewness value ≤ -2 – 2 (normal distribution)

Xylene is highly soluble in blood and body tissue, but also rapidly biotransformed to MHA which excreted in urine with elimination half-times about 1 hour after exposure.[19] In the present study, the value of MHA levels in the urine of all workers was not to be exceeded the BEI value by ACGIH (1.5 g/g of creatinine). However, the highest MHA level was in the B workshop (air sampling point 6) and consistent with the highest xylene concentration. MHA was the result of xylene metabolism which excreted in urine between 1 – 2 hours after exposure or maximum 24 hours later.[4,19,20] Its presence cannot be affected by variations of renal physiology, such as urinary pH, diuresis rate, and reabsorption.[21]a metabolite of xylene excreted in the urine, is used for biomonitoring occupational exposures to xylene. Two cases of acute occupational poisoning from xylene inhalation suggested by determination of high urinary methylhippuric acid. Two 21 and 23 years old healthy male adults collapsed after inhaling an unknown paint thinner during painting. On admission to the emergency department, they were confused and agitated, without hemodynamic or respiratory impairment. Admission urinary methylhippuric acid determined by HPLC with UV detector were 2.57 and 2.68 g/g creatinine (Biologic Exposure Index, BEI, 1.5 g/g creatinine). Compared with blood, MHA had a strong correlation with xylene exposure and recommended as an exposure biomarker.[4,12] In some studies, both variables had the significant relationship.[19,20,22–25]

The data of xylene concentration and MHA level had to transform using log 10 to normalize the distribution prior to analyzing. The correlation between xylene concentration and MHA level in urine showed very weak association (r = 0,198) and the pattern showed positive (table 2). It indicated that the higher the concentration of xylene in the air, the more MHA level in urine was excreted. The coefficient value of 0.011 which meant the regression line equation described 1.1% variation of MHA level. There was no statistically significant relationship between xylene concentration and MHA level (p = 0,511).

However, the relationship depicted a positive linear correlation which meant the higher the xylene concentration, the more MHA level. Other factors can determine the urinary excretion of MHA level. According to Inoue et al. studies in China [24], smoking and drinking alcohol tend to affect or reduce levels of MHA in the urine. In their findings, after workers exposed to xylene at a concentration of 100 ppm (434 mg/m^3), MHA levels in urine would be 1.137 g/g creatinine. This value was below the ACGIH BEI value of 1.5 g/g creatinine (xylene concentration 434 mg/m^3) because of the interaction variable consuming alcohol and smoking. Also, the level will vary from day to day and depends on the length of exposure times.[25]

Table 2. Correlation between Xylene and MHA

Variable	R	R^2	The Regression Line	P Value
Xylene (log_{10})	0,198	0,011	Y = -3,994 + 0,076 X	0,511

CONCLUSIONS

This study presented the biomonitoring of xylene exposure to the worker. As shown, MHA was no statistically significant relationship with xylene concentration in the workshop air. However, the direction of the relationship between these variables can be concluded that MHA level in urine will increase when xylene concentration increase. It is advisable to interested parties in the informal footwear industry to promote occupational safety and health in the workplace. Also, regular health monitoring should be undertaken

to control the health effect of xylene exposure. The effect cumulatively after prolongation and continuous exposure will arise.

Confilct of Interest: The absence of a relationship between the researcher and the subject causes no potential conflict of interest in this study.

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Ethical Clearance: This study received ethical clearance from the Commision of Ethic, Research, and Community Service, Faculty of Public Health of University of Indonesia number 476/UN2.F10/PPM.00.02/2017 on August 21, 2017.

REFERENCES

1. Irawati Y. Analisis Risiko Kesehatan Pajanan Xylene pada Pekerja Bengkel Sepatu "X" di Kawasan Perkampungan Industri Kecil (PIK) Pulogadung Jakarta Timur 2010 [Tesis]. Fakultas Kesehatan Masyarakat. [Depok]: Universitas Indonesia; 2010.
2. Haen MT, Oginawati K. Hubungan Pajanan Senyawa Benzena, Toluena dan Xylen dengan Sistem Hematologi Pekerja di Kawasan Industri Sepatu. Bandung; 2012.
3. Lim SK, Shin HS, Yoon KS, Kwack SJ, Um YM, Hyeon JH, et al. Risk Assessment of Volatile Organic Compounds Benzene, Toluene, Ethylbenzene, and Xylene (BTEX) in Consumer Products. J Toxicol Environ Health. 2014;77(Part A):1502–1521.
4. Kandyala R, Raghavendra SPC, Rajasekharan ST. Xylene: An overview of its health hazards and preventive measures. J Oral Maxillofac Pathol. 2010;14 (1):1–5.
5. ATSDR. Toxicological Profile for Xylenes. Atlanta, Georgia: Agency for Toxic Substances and Disease Registry; 2007.
6. Niaz K, Bahadar H, Maqbool F, Abdollahi M. A Review of Environmental and Occupational Exposure to Xylene and Its Health Concerns. EXCLI J. 2015;14:1167–86.
7. Langman JM. Xylene: Its Toxicity, Measurement of Exposure Levels, Absorption, Metabolism and Clearance. Pathology. 1994;26(3):301–9.
8. Morley R, Eccleston DW, Douglas CP, Greville WE, Scott DJ, Anderson J. Xylene poisoning: a report on one fatal case and two cases of recovery after prolonged unconsciousness. Br Med J. 1970 Aug 22;3(5720):442–3.
9. Salimi A, Talatappe BS, Pourahmad J. Xylene Induces Oxidative Stress and Mitochondria Damage in Isolated Human Lymphocytes. Toxicol Res. 2017;33(3):233–8.
10. Bahrami, Jonidi-Jafari, Mahjub. Environmental Exposure to Xylenes in Drivers and Petrol Station Workers by Urinary Methylhippuric Acid. J Res Health Sci. 2008;8(2):61–8.
11. Morgan MS. The Biological Exposure Indices : A Key Component in Protecting Workers from Toxic Chemicals. Environ Health Perspect. 2017;105(Feb):105–15.
12. ACGIH. TLVs and BEIs Based on Documentation of the Threshold Limit Values for Chemical Substances and Physical Agents & Exposure Indices. Cincinnati, OH: American Conference of Governmental Industrial Hygieniests; 2016.
13. NIOSH. Hydrocarbons, Aromatic: Method 1501. In: NIOSH Manual of Analytical Methods (NMAM). 4th ed. Atlanta, Georgia: The National Institute for Occupational Safety and Health; 2003. p. 1–7.
14. Zailina H, Syazwan MH, Naing L, Jamal HH, Rusli N. Occupational Xylene Exposure and Respiratory Impairment of Paint Manufacturing Workers. Int J Med Med Sci. 2013;5(5):214–20.
15. NIOSH. Hippuric and Methyl Hippuric Acids in Urine (NIOSH 8301). In: NIOSH Manual of Analytical Methods (NMAM). 4th ed. Atlanta, Georgia: The National Institute for Occupational Safety and Health; 2003. p. 3–7.
16. IARC. Xylenes. In: IARC Monographs Volume 71. Lyon: International Agency for Research on Cancer; 1999. p. 1189–208.
17. Thetkathuek A, Jaidee W, Saowakhontha S, Ekburanawat W. Neuropsychological Symptoms among Workers Exposed to Toluene and Xylene

in Two Paint Manufacturing Factories in Eastern Thailand. 2009;

18. Farshad A, Oliaei HK, Mirkazemi R, Bakand S. Risk Assessment of Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX) in Paint Plants of Two Automotive Industries in Iran by Using the COSSH Guideline. Eur Sci J. 2013;3:1857–7881.
19. Riihimaki V, Pfaffli P, Savolainen K, Pekari K, Riihimäki V, Pfäffli P, et al. Kinetics of m-xylene in man. General features of absorption, distribution, biotransformation and excretion in repetitive inhalation exposure. Scand J Work Environ Heal. 1979;5(3):217–31.
20. Lundberg I, Sollenberg J. Correlation of Xylene Exposure and Methyl Hippuric Acid Excretion in Urine among Paint Industry Workers. Scand J Work Environ Health. 1986 Apr;12(2):149–53.
21. Lavon O, Bentur Y. Acute Inhaled Xylene Poisoning Confirmed by Methylhippuric Acid Urine Test. J Clin Toxicol. 2015;05(06):1–2.
22. Huang M, Jin C, Liu Y, Li B, Qu Q, Uchida Y, et al. Exposure of Workers to A Mixture of Toluene and Xylenes. I Metabolism. Occup Environ Med. 1994;51:42–6.
23. Chen Z, Liu S, Cai S, Yao Y, Yin H, Ukai H, et al. Exposure of workers to a mixture of toluene and xylenes. II Effects. Occup Environ Med. 1994;8:47–9.
24. Inoue O, Seiji K, Kawai T, Watanabe T, Jin C, Cai SX, et al. Excretion of Methylhippuric Acids in Urine of Workers Exposed to A Xylene Mixture: Comparison among Three Xylene Isomers and Toluene. Int Arch Occup Environ Health. 1993;64(7):533–9.
25. Ogata M, Takatsuka Y, Tomokuni K. Excretion of Hippuric Acid and m- or p-Methylhippuric Acid in the Urine of Persons Exposed to Vapours of Toluene and m- or p-Xylene in An Exposure Chamber and in Workshops, with Specific Reference to Repeated Exposures. Br J Ind Med. 1971;28(4):382–5.

The Analysis of Risk Factors Against Malaria in the Tangkiling Public Health Center, Bukit Batu District, Palangka Raya City, Indonesia

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ABSTRACT

Malaria is an infectious disease that is a global concern. This disease is still a public health problem because it has a broad impact on quality of life and economy and is possible as an emerging and re-emerging disease. Some risk factors that support as a chain of transmission that can cause the characteristics, behavior and physical environment of the house and the environment outside the house where the community lives. The purpose of this study was to determine the relationship of characteristics, behavior, physical environment and outside the home with the incidence of malaria. The study design used was case control with a restrospective approach with 60 case group and control subjects who did not suffer from malaria. Data analysis used Chi-Square with calculation of Ods Ratio and logistic regression. The study shows risk factors associated with the incidence of Malaria were age (p: 0.001), Gender (p: 0.000), Employment (p: 0.000), while unrelated risk factors were education (p: <0.05, OR 1.3; 95% CI: 0.3-4.9) physical home (p: >0.05, OR 1.2; 95% CI: 0.5-2.4) , home environment (p: >0.05, OR 1.1; 95% CI: 0.5-2.6), Behavior (p: >0.05, OR 1.3; 95% CI: 0.64-2.68). The conclusion are age, gender, occupation and behavior have a malaria risk of 13% .

Keywords*: malaria, characteristics, home environment, behavior*

INTRODUCTION

Malaria is still a public health problem because it has a broad impact on the quality of life and the economy, and is possible as an emerging and re-emerging disease due to imfort cases and vectors that can spread Malaria. Malaria can affect the mortality and morbidity of infants, toddlers and childbirth and can reduce the productivity of human resources. The malaria morbidity rate nationally or API is still 1.69‰ slightly decreased compared to 2011 (1.75‰). Furthermore, from 33 provinces that exist, there are still 14 provinces in Indonesia with the category of medium and high endemicity areas, while the number of malaria endemic districts is 149 of the 513 districts/cities that exist. Central Kalimantan is one of 14 provinces, with moderate levels of endemicity. In 2012 morbidity of malaria or malaria API recorded 3.39‰ and is seen to decline in 2013 with a figure of 2.35‰.[1]

The city of Palangka Raya Raya includes malaria endemic areas in Central Kalimantan Province. The activities that have been carried out by Malaria Mitigation and Management Program in Palangka Raya City Health Office in controlling malaria include: MBS (Mass Blood Survey), distribution of LLNs (Long lasting Insecticidal Nets), home contact (surveillance). The number of cases in the past three years namely 2012-214 tends to decrease, where in 2012: 1,102 cases (API = 5 ‰ compared to 2013: 568 cases (API = 3 ‰) and in 2014 became API approximately 2 Selanjutnya. division of service area of work then Tangkiling Public Health Center with the highest contribution from 10 Public Health Center in Palangka Raya City against malaria morbidity rate with API 6 “in 2012 and API 3” in 2013.[1] This API number is still higher than Public Health Center of Sekupang (0.3%.), Tanjung Sekupang (0.2%), Sei Pancur (0.2%) Batam City.[2] Tangkiling health center when viewed from

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topography conditions and the condition of the area including lowlands and peat soils that are almost flooded for the whole year, coupled with sewage / ditch disposal systems that have not been well organized.

This study took place in the Tangkiling Public Health Center in Bukit Batu Sub-district, Palangka Raya City, with consideration that malaria cases in the area were still high and in residential areas there were forest and scrub areas that allowed high malaria transmission, besides malaria was an infectious disease caused by infection protozoa from the genus plasmodium which are at high risk of death with a relatively fast transmission process.[4]

MATERIALS AND METHOD

This type of research is observational using retrospective study method with the approach of case control studies. The case population in this study were all residents in the work area of the Tangkiling Public Health Center in Bukit Batu Subdistrict, Palangka Raya City, which suffered from malaria which was positive (+) reported to Palangka Raya City Health Office, 2014-2016 period. The control population in this study were all residents of the Tangkiling Public Health Center in Bukit Batu sub-district, Palangka Raya City, who did not suffer from malaria but came to the public health center with complaints of other diseases or showed symptoms of fever, dizziness, vomiting and after being tested for negative (-) malaria.

FINDINGS

Table 1. Proportion of Case and Control Patients according to Risk Factors,

Tangkiling District, Palangkaraya, 2014-201 6 (n = 60)

Variable	Case		Control		Total		P value	OR	95% CI
	n	%	n	%	n				
Level of education									
Elementary school	5	8.3	5	8.3	10	8.3	0.408	1	0.2-2.9
Secondary school	29	48.3	22	36.7	51	42.5		1.3	0.3-4.9
High school	26	43.3	33	55	59	49.2		1 *	-
Age (years)									
<21	16	26.7	2	3.3	18	15	0.001*	1 *	-
21-54	40	66.7	48	80	88	73.3		9.6	2 - 44.3
> 54	4	6.7	10	16.7	14	11.7		20	3.1 - 130.1
Work									
Office workers	10	16.7	27	45.0	37	30.8	0.000*	15.1	4.6 - 50.0
Farmer-fisherman	22	36.7	28	46.7	50	41.7		7.1	2.4 - 21.5
Student-household	28	46.7	5	8.3	33	27.5		1 *	-
Gender									
Male	37	61.7	56	93.3	93	77.5	0.000*	8.7	2.8 - 27.2
Female	23	38.3	4	6.7	27	22.5			
Behavior									
Good	32	53.3	28	46.7	60	50	0.465	1.3	0.64 - 2.68
Not good	28	46.7	32	53.3	60	50			
Physical in the house									
Healthy	39	65	37	61.7	76	63.3	0.705	1.2	0.5 - 2.4
Not healthy	21	35	23	38.3	44	36.7			
Physical outdoors									
Healthy	47	78.3	46	76.7	93	77.5	0.827	1.1	0.5 - 2.6
Not healthy	13	21.7	14	23.3	27	22.5			

Notes:

* Referens (using simple logistic regression test)

Test using Chi-Square (χ^2)

Table 2. Logistic Regression Analysis of Relationship between Age, Job, and Variables Gender with Malaria Events, in Tangkiling, 2014 - 2016 (n = 120)

Variabe 1	Model 1	Model 2
	OR	OR
	95% CI	95% CI
Age <21 years 21-54 years > 54 years	 1 12.3 (1.2-123.7) 19.76 (1.5-255.4)	 1 11.4 (2.4-54.7) 17.5 (2.6-119.6)
Work Office workers Farmer-fisherman Student-household	 0.7 (0.06-7.91) 1.5 (0.13-17.2) 1	 -
Gender Male Female	 9 (0.9-99.8)	 9.3 (2.9-30.0)
N	60	60
R^2	0.326	0.326
-2loglikelihood	132.6	132.6

Based on the logistic regression above, when the variable job was attempted to be issued there was a change in the odds ratio reach 11%. If the change in the odds ratio> 10% then the variable is re-entered into the regression equation. So, in this study that affects the incidence of malaria is the variable age, occupation and gender.

DISCUSSION

The relationship between the characteristics of respondents with the incidence of malaria

Age is a unit of time that measures the time of existence of an object or creature, both living and dead, for example the age of a human being is said to be measured fifteen years from the time he was born until the time of the count was calculated. By this age is measured from attraction only born so that the attraction of the event begins as long as the date (present).[3] The results of the study found that respondents aged> 54 years were at risk of getting malaria by 20 times compared to respondents aged <21 years (OR = 20; 95%: 3.1-130.1). This risk is supported by the results of a simple logistic regression statistical test that gets a P value = 0.001 (P value <0.05).

Gender is the difference between women and men biologically since birth. Risk factors for female characteristics (gender) have a risk of getting malaria by 8.7 times compared to male sex. The P value obtained from the statistical test is 0,000 (P value <0.05) which means there is a difference in the proportion of malaria events between male and female.

Education is an effort to develop personality and abilities inside and outside the school and last a lifetime. Based on a simple logistic regression statistical test, it shows a similar condition, namely P value> 0.05, meaning that there is no difference in malaria incidence based on the respondent's education level (P value = 0.408). Despite, respondents had junior high school education, the risk for malaria was 1.3 times compared to those with high school and higher education (OR 1.3; 95% CI 0.3-4.9). In general, someone who has more higher education will usually find it easier to understand information about something including information about malaria because he can read. This is because the information that is available is more found in the media, leaplets and counseling from officers. Education influences the learning process, the higher one's education the easier it is for the person to receive

information. With higher education one will tend to get information, both from other people and the mass media. Knowledge is very closely related to education where it is expected that someone with higher education, then the person will also be more knowledgeable. But it needs to be emphasized that a person with low education does not mean absolute low knowledge. Increased knowledge is not absolutely obtained from formal education, but can also be obtained from non-formal education.

Work is an activity or activity of a person to earn income for his daily life needs. Long work is an individual experience that will determine growth in work. Work in a broad sense is the main activity carried out by humans. In a narrow sense Job terms are used for a task or work that makes money for someone. Characteristic factors (jobs) that were fishermen and farmers had 7.1 times the risk of contracting malaria diba n dingkan with students and household (OR = 7.1; 95% CI: 2.4 to 21.5). Based on statistical tests obtained P value = 0,000 (P value <0.05). Work related to the incidence of DHF. There are 58.8% of sufferers in Donggala are those who do activities outside the house at night. The work as a peasant farmer causes them to stay in the forest until the afternoon, even though they rarely stay there for a few days or weeks to farm, while they become fishermen laborers must start fishing from the afternoon until the dawn is in the open lake, the river in the fish auction this condition gives a big risk to be bitten by mosquitoes, including *Anopheles Sp.*[5]

The relationship between physical environmental factors of the house and the incidence of malaria

Socio-culture also affects the incidence of malaria, such as: the habit of going out late into the night, where the vector is exophilic and exophagic will facilitate contact with mosquitoes. The level of public awareness about the dangers of malaria will affect the willingness of the community to eradicate malaria such as environmental sanitation, using mosquito nets, installing wire netting on the house and using insect repellent.

The results of the analysis that the home environmental factors obtained values (OR: 1.2; 95% Cl: 0.5-2.4). This was supported from a statistical test which states that there is no relationship between the physical environment of the house and the incidence of malaria (P value> 0.05).

The relationship between environmental factors outside the home and the incidence of malaria

Environmental conditions have a major effect on the presence or absence of malaria in an area. The presence of freshwater lakes, rainwater pools, rice fields, forest clearing, fish ponds and mining in an area will increase the likelihood of malaria, because the place is a breeding place for malaria mosquitoes, temperature and rainfall are also important.[6] The results found that the state of the physical environment outside the home also showed no significant difference (OR = 1.1; 95% CI: 0.5-2.6). This is supported by a statistical test which states that there is no relationship between the physical environment outside the home and the incidence of malaria (P value > 0.05).

There is a significant relationship with the incidence of malaria p: <0.005 (use of gauze and type of house) with the incidence of Malaria in the area of Sarmi City Public Health Center Sarmi Regency. The analysis of risk factors for malaria in Bengkulu which states that ventilation using gauze, the habit of using mosquito nets, the use of mosquito repellent affects the incidence of malaria. Some factual reasons, why there is no relationship between the physical factors of the house, according to information from the person in charge of Malria Tangkiling Public Health Center that some malaria cases were found were infort cases (malaria because of working as sawait plantation laborers, traditional community mining) when they were sick home Tangkiling Public Health Center. Various human activities such as dam building, road building, mining and the construction of new settlements/transmigration often result in environmental changes that benefit malaria transmission.[6]

The relationship between behavioral factors and the incidence of malaria

Behavior is a response or reaction to a person's stimulus (external stimuli). This behavior occurs through the process of a stimulus to the organism and then the organism responds. Health behavior is a person's response (organism) to a stimulus or object related to illness and disease, health care system, food, and drink and the environment. Based on statistical analysis that behavioral variables obtained OR value 1.3 means that respondents who have poor behavior are more at risk of being exposed to 1.3 times compared to respondents have good grades, but this risk is not supported by

statistical tests which state that there is no relationship between behavioral factors with Malaria incidence is P = 0.465 (P >0.005). Another reason was due to malaria control activities at the Tangkiling Public Health Center since 2013 such as: Mass Blood Survey, Long Lasting Insecticidal Distribution (LLINs) in bulk together with routine MCH and Immunization activities, housing contracts through a positive Malaria survey, so that health behaviors can be accepted by the community. The risk of malaria can occur because of the poor habits and attitudes of the community is a supporting factor in the spread and facilitate the occurrence of malaria such as the habit of being outdoors at night, sleeping habits do not use anti-mosquito drugs during sleep.

CONCLUSION

The results of the study showed risk factors related to the incidence of malaria, namely age (p: 0.001), gender (p: 0.000.), occupation (p: 0.000), while unrelated risk factors were education (p: >0.05; OR 1.3; 95% CI 0.3-4.9), physical home (p >0.05; OR 1.2; 95% CI: 0.5-2.4), home environment (p >0.05; OR = 1.1; 95% CI: 0.5-2.6), Behavior (p >0.05 , OR = 1.3; 95% CI: 0.64-2.68).

Ethical Clearance: Before conducting the data retrieval, the researchers conducted a decent test of ethics conducted at the Polytechnic of Health, Ministry of Health, Republic of Indonesia, Palangka Raya to determine that this study has met the feasibility. Information on an ethical test that the study is eligible to continue. The feasibility of the research was conducted in an effort to protect the human rights and security of research subjects.

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Conflict of Interest: The authors declare that they have no conflict interests.

REFERENCES

1. Central Kalimantan Provincial Health Office. Provincial Health Profile. Palangka Raya. 2013.
2. Batam City Health Office. Batam City Health Profile. Batam. 2006.
3. Ministry of Health Republic of Indonesia. Health Promotion Center "General Information on Malaria. Jakarta. 2009.
4. Prasetyo A. Malaria. (online). Accesssed from http://. www.informationcenterforinfectiousdiseases_ especiallyHIV-AIDS-Disease-Malaria.htm. Jakarta. 2006.
5. Noor N.N. Introduction to the Epidemic of Infectious Diseases. Jakarta: Rineka Cipta 2006.
6. Ministry of Health Republic of Indonesia. Malaria Case Management Guidelines in Indonesia. Directorate General of PP-LP. Jakarta. 2008.

Correlation between Micronutrient intake and Hemoglobin Preconception Women

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ABSTRACT

The preconception period is the time to prepare for pregnancy, and it is prone to anemia. While iron deficiency is considered the main cause of nutritional anemia, changes in vitamin B6, vitamin B12, folic acid and zinc status are also associated with the formation and hemoglobin levels. This study aims to determine the relationship between intake of iron, vitamin B6, vitamin B12, folic acid and zinc with hemoglobin levels in preconception women in Banggai Regency from October 2016 to April 2017. This study was cross-sectional study design. Using data from a 24-hour food recall assessment, measuring the daily intake for each respondent of 132 preconception women in three sub-districts in Banggai Regency. Micronutrient intake was obtained by comparing nutritional intake with the table of the Nutrient Adequacy Rate (NAR) 2013. Hemoglobin levels were measured by the *cyanmethaemoglobin* method. The result of this study, the proportion of RDA is below-estimated average needs. As a result, the average hemoglobin level was 12.67 ± 1.24 g/dl. There were 20% anemia, from anemia respondents suffering from mild anemia (16%) and moderate anemia (4%). With the Pearson correlation test, there was no significant relationship between iron (r=0.056), vitamin B6 (r=0,06), vitamin B12 (r=0.085), folic acid (r=0.062) and zinc intake with hemoglobin levels. In conclusion, the most preconception women are still at risk of lacking micronutrients such as iron, zinc, folate, vitamin B12, and vitamin B6. Prenatal counseling about the importance of nutrition for the health of pregnant women and their babies are needed.

***Keywords**: preconception women, micronutrient intake*

INTRODUCTION

Globally, around 32 million pregnant women and 273 million children under five suffer from anemia in Southeast Asia, the burden of anemia is very high and more than 1 in 4 women suffer from anemia during pregnancy. The causes of anemia vary, but iron deficiency has been identified as the most common and has been associated with an increased risk of maternal and perinatal death and poor birth outcomes[1].

Banggai Regency in Central Sulawesi Province, Indonesia has a high prevalence of anemia of 36.6% in women[2] compared to the prevalence of anemia on the national scale recently 22.7%[3] prevalence rate anemia is higher in Banggai Regency. The study was conducted in three sub-districts, namely Luwuk, North Luwuk and South Luwuk sub-districts in Banggai Regency, to determine the prevalence of anemia in preconception women. Anemia has been associated with poor health outcomes such as cognitive impairment, reduced work capacity, increased maternal morbidity and mortality, low birth weight, and increased fetal and neonatal mortality.

Anemia is a wide public health problem associated with an increased risk of morbidity and mortality. Among many factors, good nutrition (such as vitamins and mineral deficiencies), non-nutrients (such as infections and *hamoglobinopathies*, blood loss, and metabolic disorders) that contribute to the onset of anemia[4,5]. Although iron deficiency is a major cause of anemia, especially in women of reproductive age, anemia can also be caused by a lack of folic acid, vitamin B12, vitamin B6 and zinc status is also associated with the development and control of heme formation[5]. The point of determining *hemoglobin* for the diagnosis of anemia

in women of reproductive age <12 g / dl.

In the human body iron deficiency is very common as the most common cause of anemia throughout the world. To better understand iron deficiency anemia, for the production of erythrocytes requires iron. Need a large amount of strong iron for erythrocytes and its precursors, further for the production of hemoglobin and heme. Iron is very important for the structure and function of hemoglobin[6].

The prevalence of anemia is still highly influenced by micronutrient deficiency as one of the factors in heme synthesis in the body. Vitamin B6 deficiency can block the initial enzymatic steps of heme synthesis and use of iron in *erythropoietic* cells. Vitamin B6 deficiency of the aminolevulinate synthase enzyme can cause iron refractory[7]. This study aims to determine the relationship between micronutrient intake and hemoglobin levels in preconception women.

MATERIAL AND METHOD

This research was conducted in Banggai Regency in 3 sub-districts; Luwuk, North Luwuk and South Luwuk from October 2016 to April 2017. This research was an observational study with cross-sectional design. The study population consisted of 132 pre-conception women who were included in the inclusion criteria, aged between 18-35 years, had never been pregnant and did not suffer from an infectious disease. The research population has been registered to be married at the Office of Religious Affairs (ORA) of Banggai Regency, Central Sulawesi. Mothers come to sign an informed consent, are willing to take part in the research, and attend the recruitment process. The research data used a questionnaire which included the average intake of micronutrients for iron, folate, vitamin B6, vitamin B12, zinc and Hb examination as primary data.

The research data was obtained from the study population who entered the inclusion criteria by interviewing using a questionnaire. Data collection on the average intake of micronutrients (iron, folate, vitamin B6, vitamin B12, zinc) using in-depth interview methods for daily food consumption, 24-hour recall of food, namely quantitative methods of food consumption surveys that can provide information about food and drinks consumed by the subject for 24 hours. The 24-hour Food Recall method is used to assess the consumption of food eaten and drunk for the past 24 hours, since waking up yesterday morning to sleep at night, a 24-hour recall should be done repeatedly and not consecutive days. Food consumption intake data can represent respondents' eating habits.

The respondents' micronutrient intake data were then processed using Nutrisurvey software, compared to the adequacy of micronutrient consumption based on the table of NAR 2013. The NAR is a reference for nutritional intake for Indonesia aimed at knowing the right daily nutritional intake for individuals in Indonesia. To see the level of adequacy of micronutrients respondents used two categories of inadequate if <77% NAR and adequate if ≥ 77% NAR[8]. The next step is measuring the hemoglobin level of the subject using the cyanmethemoglobin method.

Research data is processed and analyzed statistically. Univariate analysis was carried out by entering data and then explained the mean and standard intake of iron, zinc, folate, vitamin B6, vitamin B12, *hemoglobin* levels in preconception women. The relationship of each intake of micronutrients with Hb levels was analyzed using bivariate Pearson correlation test analysis.

RESULTS

Data obtained from the results of the study showed that some respondents did not suffer from anemia by 80% with an average hemoglobin level of 12.67 ± 1.24 g/dl. A total of 27 respondents (20%) suffered from anemia, and most of the anemia respondents had mild anemia of 77.8% while moderate anemia was 22.2% (**Table 1**).

Table 1: Distribution of hemoglobin levels of respondents

Category	n	%
Anemia (Hb<12g/dl)	27	20
Non Anemia (Hb>12g/dl)	105	80
Total	132	100

Table 2 shows the mean intake of micronutrients among study participants. There is no correlation between micronutrient intake and haemoglobin level of the respondents. However, Vitamin B12 shows the highest adequacy levels while folic acid is the lowest.

Table 2: Average intake of micronutrients and respondents, and the results of the correlation with hemoglobin levels

Variable	Mean ± SD	Min	Max	Adequacy Levels (%)	p
Fe	6.29 ± **4.2**	1.98	24.39	48.38	0.52
Vit B6	0.92 ± **0.38**	0.38	2.63	70.76	0.49
Vit B12	2.92 ± **2.18**	0.10	2.91	121.66	0.33
Folic Acid	97.80 ± **48.18**	22.0	283.30	24.25	0.48
Zinc	6.04 ± **2.61**	2.12	19.85	46.46	0.99
Hb level	12.68 ± **1.24**	7.3	15.9		

DISCUSSION

Women of childbearing age have low iron reserves, so women tend to be more vulnerable to iron deficiency when iron intake is reduced or when demand increases. If the intake of too little food contains iron and iron in the consumption of low bioavailability and iron reserves in the body are used continuously to meet the required iron requirements, the stored iron will be depleted and the body will be deficient in iron[9].

The form of iron consumed and other constituents in food greatly affect the absorption of iron. Iron derived from plant products is often consumed, while iron with bioavailable higher in heme iron is often consumed in small amounts. Non-heme iron is often poorly absorbed[10]. Haem iron can be obtained about 40% iron in meat, fish, poultry and is well absorbed by the body, about 60% of iron is obtained from animal tissues (liver). Iron from plants (fruits, vegetables, grains, beans) non haem iron forms is relatively difficult to absorb. The average iron intake of respondents is still less than the recommended NAR and the level of adequacy is adequate, reaching only 48.38%. After being processed using Nutrisurvey software, it turns out that the consumption deficit of iron, so that the process of hemoglobin synthesis still uses iron reserves in the body. The 24-hour recall results stated the lack of iron consumption in respondents because the majority of iron sources were obtained from non-haem iron, namely vegetables, fruits, cereals (rice, corn) and consumption of haem iron from fish and ungags. The average consumption of iron negatively correlates with hemoglobin levels. Respondents who were not anemic, the consumption of iron deficit and the possibility of respondents still having iron stores of ferritin in the liver for hemoglobin synthesis.

The results showed that the average intake of vitamin B6 from respondents was insufficient, still less than the recommended NAR and only reached 70.76% (<77% NAR). 24-hour recall analysis showed that vitamin B6 intake on average was lower, and consumption of vitamin B6 did not correlate significantly with hemoglobin. Vitamin B6 deficiency can block the enzymatic steps of initial heme synthesis and use of iron in erythropoiet5ic cells. Vitamin B6 deficiency of the aminolevulinate synthase enzyme can cause iron refractory Vitamin B6 acts as an enzyme cofactor in the process of heme biosynthesis. This vitamin must be sufficient for hemoglobin synthesis so that the heme formation process runs well, when its availability in the body is low it will interfere with globin synthesis and is not available for erythropoiesis[7].

The average intake of vitamin B12 respondents was good, and reached 121.66%. The results of a 24-hour recall show that the food source of vitamin B12 consumed by respondents is eggs, fish, and poultry. Further analysis showed that vitamin B12 intake did not correlate significantly. Although vitamin B12 intake is good, but it does not directly increase hemoglobin levels, because micronutrients interact with each other to increase hemoglobin levels. Vitamin B12 plays a role in various metabolic as a coenzyme. Vitamin B12 (cobalamin), the active form of cobalamin as methylcobalamin, coenzyme synthase methionine, an enzyme involved in the synthesis of methionine and tetrahydrofolate from methyl tetrahydrofolate and homocystein. This is where the folate and cobalamin (vitamin B12) metabolic pathways meet and are called

"folate traps" Cobalamin deficiency is usually caused by poor absorption of folate in the digestive tract[11].

Food sources rich in folate are wheat germ, yeast, innards (especially liver), cereals, and leafy vegetables. The folate content in food will decrease significantly when it takes too long to cook vegetables. Folate is a sensitive molecule that can be degraded by heat and oxidation. This is what causes folate deficiency to occur[12]. Lack of consumption of folate by respondents. Because of the lack of sources of food consumption of folic acid from respondents such as liver, and meat, which is not a habit of the respondent's diet. The results of 24-hour recall, the average intake of folate respondents was inadequate, still less than the recommended and only reached 24.25% (<77% NAR). Analysis showed that folate intake did not correlate significantly with hemoglobin NAR. Because folic acid is not biochemically active, folate is converted to tetrahydrofolate acid and methyltetrahydrofolate. This form of folic acid is transported by receptor-mediated endocytosis in cells to maintain normal erythropoiesis. Lack of folate and cobalamin (vitamin B12) ultimately causes thymidylate deficiency. DNA contains 2 pyrimidine bases (thymin and cytosine) and 2 purine bases (adenine and guanine). When thymidylate or thymine is deficient in position in the strand the DNA will be replaced by uracil. When uracil units in the structure of DNA, repair enzymes know and try to repair DNA. If it fails to repair DNA abnormal DNA synthesis or apoptosis will occur, which will cause erythropoiesis to be ineffective[11].

Foods that contain lots of zinc come from animals, especially meat. Other foods rich in zinc are legumes, whole grains, nuts, and seeds. Heme formation can be disrupted if the body suffers from zinc deficiency and this usually occurs due to insufficient need for zinc[13]. The average zinc consumption of respondents was less than the recommended NAR and the level of adequacy was inadequate because it only reached 46.46% (NAR <77%). The results of the 24-hour recall analysis showed that respondents consumed fish, poultry and peanut groups as sources of zinc food. Zinc intake did not correlate significantly with hemoglobin. Zinc is involved in the synthesis of hemoglobin through the activity of zinc-dependent enzyme systems, namely aminolevulinic acid dehydrase which plays a role in heme synthesis, which occurs in the cytosol cell[14].

CONCLUSION

Preconception mothers are mostly at risk of lacking micronutrients such as iron, zinc, *folate*, vitamin B12, and vitamin B6 which can interfere with the formation of hemoglobin. Understanding the importance of nutrition is needed, through prenuptial counseling about the importance of nutrition for the health of pregnant women and their babies.

Ethical Clearance: This study received ethical approval from Ethical Committee, Faculty of Medicine, Hasanuddin University.

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REFERENCES

1. Nguyen PH, Young M, Gonzalez-CasanovaI, Pham HQ, Nguyen H,Truong TV, Nguyen SV, Harding KB, Reinhart AG, Martorell R, Ramakrishnan U. Impact of Preconception Micronutrie nt Supplementation on Anemia and Iron Status during Pregnancy and Postpartum: A Randomized Controlled Trial in Rural Vietnam. PLoS ONE. 2016; 11(12).
2. Banggai Regency Health Office. Health Report of Banggai Regency year 2007. Banggai Regency: DHO documents; 2008.
3. Ministry of Health. National Health Report year 2013. Jakarta: Ministry of Health Documents; 2014.
4. Kraemer K and Zimmermann MB. Nutritional Anemia. Basel: Sight and Life Press; 2007.
5. Fishman SM, Christian P, and West Jr. KP. The role of vitamins in the prevention and control of anaemia. Public Health Nutrition. 2000; 3(2), 125-150.
6. Miller JL. Iron Deficiency Anemia: A Common and Curable Disease. Cold Spring Harb Perspect Med 2013; 3(7).
7. Hisano M, Suzuki R, Sago H, A Murashima A, and Yamaguchi K. Vitamin B6 deficiency and anemia in pregnancy. European Journal of Clinical Nutrition. 2010; 64: 221–223.
8. Gibson, R.S., Ferguson, E.L. An interactive 24-Hour recalls for assessing the adequacy of iron and zinc intakes in developing countries. Washington DC: ILSI Press; 2008.

9. Gleason G and Scrimshaw NS. An Overview the functional significance of iron deficiency. In: Kraemer K and Zimmermann MB. Nutritional Anemia. Basel: Sight and Life Press; 2007: 45-58.
10. Backstrand JR, Allen LH, Black AK, Mata Md, and Pelto GH. Diet and iron status of nonpregnant women in rural Central Mexico. Am J Clin Nutr. 2002;76:156–64.
11. Castellanos-Sinco HB et al. Megaloblastic anaemia: Folic acid and vitamin B12. Rev Med Hosp Gen Mex. 2015;78(3):135-143.
12. Delchier N, Herbig AN, Rychlik M, Renard CMGC. Folates in Fruits and Vegetables: Contents, Processing, and Stability. Comprehensive Reviews in Food Science and Food Safety. 2016; 15(3): 506-528.
13. Hunt JR. Bioavailability of iron, zinc, and other trace minerals from vegetarian diets. Am J Clin Nutr. 2003;78(suppl): 633S–9S.
14. Gibson RS, Abebe Y, Stabler S, Allen RH, Westcott JE, Stoecker BJ, Krebs NF, and K. Hambidge M. Zinc, Gravida, Infection, and Iron, but Not Vitamin B-12 or Folate Status, Predict Hemoglobin during Pregnancy in Southern Ethiopia. J Nutr. 2008 March; 138(3): 581–586.

Antibiotic Susceptibility Profile and Molecular Characterization of Quinolones Resistant *Klebsiella Pneumonia* Isolates: First Report from Iraq

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ABSTRACT

Background: In recent years enormous use of quinolones leads to increasing resistance towards multiple antimicrobial agents, by various pathogens in different geographical regions with the varying rate.

Objective: In this study, we report the antibiotic susceptibility profile and molecular characterization of Quinolones resistant *Klebsiella pneumonia* isolates originated from Iraq province.

Methodology: *Klebsiella pneumonia* isolates grown from various clinical sources were phenotypically confirmed by a pool of biochemical tests and reconfirmed using gene sequence of *rpo* housekeeping gene. Antibiotic susceptibility biogram was carried by disc diffusion agar method, quinolones resistant isolates were subjected to ciprofloxacin MIC testing and cartwheel method was used to determine the screening efflux pump activity in resistant isolates. All resistant isolates were subjected to molecular screening to detect resistance genes *gyrA, parC*, *qepA, qnrB, qnrS* and *aac(6)Ib*.

Results: Forty-three *K. pneumonia* isolated were identified by biochemical testing and confirmed by rpo gene sequence. Antibiotic susceptibility results showed a high rate of resistance to Ceftriaxone, gentamicin ciprofloxacin, and Levofloxacin antibiotics. Ciprofloxacin MIC results revealed 96.1% isolates had value above 256 µg/ml. Ciprofloxacin mixed with EtBr at various concentrations resulted in a decrease of MIC. Genetic detection revealed the predominance of *gyrA* and *aac(6)Ib* gene. The phylogenetic trees showed the high clonal diversity among isolates.

Conclusion: The high percentage of resistance towards different types of antibiotics including fluoroquinolones is considered to be problematic for public health and represents a serious challenge to infectious disease specialists worldwide.

Keyword: *MDR K. pneumoniae; quinolones resistance gene; PMQR; cartwheel test.*

INTRODUCTION

Antimicrobial agents' quinolones prescribed as the best treatment for community and hospitals acquired infections[1] including multidrug-resistant Gram-negative bacteria such as *Klebsiella pneumonia* which is a member of the notorious "ESKAPE" group organism [2, 3]. Quinolone is one of most used and effective antibiotic for the treatment of multidrug-resistant bacteria which has broad-spectrum antimicrobial activity. *K. pneumonia* resists antibiotic action through several mechanisms which includes drug inactivation, target alteration, increased efflux pump activity and decreased cell permeability [1]. Resistance to quinolones is mediated by mutation occurred in chromosomal genes encoding to DNA gyrase and/or topoisomerase IV additional to mutation occurred in regulatory genes that regulate efflux pumps activity [4], otherwise, resistance to quinolones

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occurred in bacteria basically by a chromosomal mutation in parC and gyrA genes of QRDR region [3, 5].

The previous assumption was that quinolones resistance is due to bacterial chromosomal mutations. It was later in 1998 they described plasmid-mediated genes in *K. pneumonia*, named ‟qnr‟ which encodes pentapeptide repeat family plays role in binding and protecting DNA gyrase and topoisomerase IV from the repression of ciprofloxacin [4, 6, 7]. Later four major groups *qnr* genes qnrA, qnrB, qnrC and qnrS, were identified together with two plasmid-mediated quinolones resistance (PMQR) genes aac(6')-Ib-cr and qepA encods various aminoglycoside transferases that modify ciprofloxacin to facilitate an efflux pump protein [8]. Bifunctional acetyltransferase protein is coded by aac(6')-bI-cr acetylate amino nitrogen in piperazine of fluoroquinolones such as norfloxacin, ciprofloxacin, and aminoglycoside such as amikacin and kanamycin [9]. This gene commonly exists in the multi-resistance plasmid as a cassette in integrin, and may also have other PMQR genes additional to ESBL CTX-M-15 [7, 10, 11]. Hydrophilic fluoroquinolones such as norfloxacin and ciprofloxacin can be decreased by plasmid-mediated efflux pump QepA which is the major group of facilitator family, exist in plasmid encoding to aminoglycoside ribosomal methylase *rmtB* [12, 13, 14]. Increasing prevalence of PMQR have been reported worldwide in clinical isolates of *K. pneumonia*, however, there is no report evaluating the quinolone resistance epidemiology in Iraq. This would be the first study where we characterized predominant of quinolones resistant gene in the capital of Iraq (Baghdad city).

MATERIAL & METHOD

Isolation & identification of *K. pneumoniae*:

Forty-three bacterial isolates from *Klebsiella pneumonia* were collected between June and December 2016. These isolates were obtained from patients attending medical care services in Baghdad hospitals, Medical city hospital, Ibn Balady hospital, Al-Zahra hospital and Al-Yarmok hospital in Baghdad city. Bacterial species identification was based on the morphological and biochemical test, followed by using *rpo* gene sequence analysis. The sequence of oligonucleotides of *rpoB* gene specific design for this study as listed in the table (1).

Antimicrobial susceptibility test and Minimum inhibitory concentration (MIC) for ciprofloxacin

Susceptibility to various antimicrobial agents was performed using the disk diffusion method and Mueller-Hinton agar according to the CLSI guidelines [15]. MIC was performed against all 27 resistance isolates according to the CLSI [15] criteria following a standard agar dilution method started with 1024µg/ml and applied two serial dilutions. *Escherichia coli* ATCC 25922 was used as quality stander strain (Central Public Health Laboratory, Baghdad).

Efflux pump detection-cartwheel method (screening method)

Phenotypic detection of Efflux Pumps mechanism was performed by EtBr-agar cartwheel (EtBrCW) method in MHR agar plates using Ciprofloxacin and EtBr stain [16]. EtBrCW was done by EtBr stain at various concentration (5, 10,15,20,25 µl/ml) on MHA agar plates containing ciprofloxacin ranging from 16 to 1024 µg / ml which prepared on the same day for the experiment. The minimum concentration of EB that produced fluorescence of the bacterial mass was recorded [17]. In the study, we used Escherichia *coli* ATCC 25922 strains as negative controls.

Genotypic analysis: Quinolones resistance genes detection

The DNA extraction was performed for all isolates according to genomic extraction kit following Manufacture instruction (wizbio/ Korea). All the isolates were subjected to molecular screening by PCR amplification technique to detect Quinolone Resistance genes, Different primers were used as listed in (table 1), PCR products were sent for sequencing, which was carried out by Macrogen DNA Sequencing (Seoul, Korea) and compared with NCBI (https://www.ncbi.nlm.nih.gov/**).**

RESULTS

Isolation &identification

The isolates were collected from various clinical samples such as wound infection (n=13), bloodstream infection (n=8), urinary tract infection (n=8), burn (n=5), ear (n=4), sputum (n=3), and one each from the fluid, and bronchial infection. All the isolates were confirmed as *K. pneumoniae* by phenotypic identification using a set of biochemical test, followed by the Vitek 2 system,

then re-confirmed by gene sequence analysis of *rpoB* gene (β-subunit of RNA polymerase).

Antibiotic susceptibility test

The resistance pattern differs from being highly resistant to CRO 86.04% (37/43), followed by GM (69.7%; 30/43), CIP & LEV (60.4%; 26/43). Isolates showed moderated resistance to AUG & NOR & FOX (55.8%; 24/43), IMI (53.4%; 23/43) and AK (48.8%; 21/43) as compared ATH (44.1%; 19/43).

The results of the MIC test showed that n all isolates were completely resistant to Ciprofloxacin with MI(C higher than 16 µg /ml. , while 25/ 27(96.1%) of isolates had MIC above 256 µg /ml, 23/27 (83.4%) of isolates showed 512 µg /ml and 9/27 (34.6%) of isolates showed 1024 µg /ml of MIC to Ciprofloxacin alone. While, when we mixed Ciprofloxacin with Ethidium bromide (EtBr) for detection in efflux pump by agar cartwheel method (screening method) the results showed a decrease in resistance rates. The study isolates showed 100% resistance to at 16, 32 and 64 µg /ml of EtBr, while decrees to 92.3% (24/ 27) when used with 128 and 256 µg /ml with EtBr. Resistant was further decreased to 69.2% (18/ 27) in 512 µg /ml of EtBr. With the use of 1024 µg /ml EtBr, this resistant was seen only in 19.2% (5/ 27) isolates. **Figure 2** showed the accumulation of fluorescent chromophore by efflux pump activity of isolates, furthermore, table (2) showed the distribution of efflux activity with a verity concentration of EtBr (Table 3).

Results of Genetics detection for antibiotics resistance genes revealed that 27 isolates harbor more than one mechanism of resistance to quinolones and modification enzymes in aminoglycosides. The most predominance genes was *aac(6)-Ib* gene 25(92.5%), followed by *parC* gene 20/27 (74.1%), *gyrA* gene 18/27 (66.6%), and *qnrB* gene 14/27 (51.8%), while show low percentage predominance of *qepA* gene 11/ 27(40.7%) and *qnrS* gene 10 (37.03%) was also observed. Table (2) illustrates the distribution of the resistance gene among *K. pneumonia* (27/43) isolates. The phylogenetic tree was built depending on antibiotic susceptibility; the isolates showed high clonal diversity as it appears in **figure 1a & 1b**.

Table (1): The primers used in the current study for PCR amplification

Name of genes	Primers 5 ---- 3	Size products	Tm	References
gyrA	F-AAATCTGCTCGTGTCGTTGG-3 R- GCCATACCTACAGCAATACC-3	349bp	52 C	2
parC	F-AAGCCCGTACAGCGCCGTATT-3' R'-AAAGTTATCTTGCCATTCGCT-3'	327bp	60	2
qepA	F- AACTGCTTGAGCCCGTAGAT -3' R - GTCTACGCCATGGACCTCAC - 3'	596bp	54 C	18
qnrB	F-GATCGTGAAAGCCAGAAAGG -3' R- ATGAGCAACGATGCCTGGTA - 3'	476bp	52 C	18
qnrS	F- GCAAGTTCATTGAACAGGGT- 3' R- TCTAAACCGTCGAGTTCGGCG- 3'	428bp	60 C	18
rpoB	F- GGC GAA ATG GCW GAG AAC - 3' R- GAG TCT TCG AAG TTG TAA - 3'	1056 bp	50 C	This study
aac(6')-Ib-	F- TTG CGA TGC TCT ATG AGT GGCTA R- CTC GAA TGC CTG GCG TGT TT	482bp	56	19

Table (2): Determination of efflux activity at varying concentrations of ethidium bromide as fluorochrom

No. of Resistance isolates	Concentration of EtBr+ Ciprofloxacin at which bacteria started to fluoresce (µg /ml)	Efflux activity
1	1024	+
3	512	+
6	512	+
9	64	-
12	1024	+
13	512	-
15	512	+
17	512	+
18	1024	-
19	512	-
20	512	-
21	512	-
23	512	-
25	512	-
26	256	-
27	512	-
28	512	-
29	256	-
30	256	+
31	512	-
32	64	-
33	512	+
35	512	+
36	512	-
41	512	-
42	512	-
43	1024	+

Cont.. **Table (2):**

Table (3): Distribution of quinolones resistance genes according to the source of *Klebsiella pneumoniae* clinical isolates (N=27)

Quinolones Resistance Genes	No. of isolates	wound	blood	sputum	burn	UTI	ear	bronchial
gyrA	18(66.6%)	5	3	1	3	5	1	0
parC	20(74.1%)	7	3	1	3	4	1	1
aac (6)-Ib	25(92.5%)	8	3	1	6	5	2	0
qepA	11(40.7%)	3	1	1	2	2	1	1
qnrB	14(51.8%)	4	3	0	4	2	1	0
qnrS	10(37.03%)	1	1	1	3	2	1	1

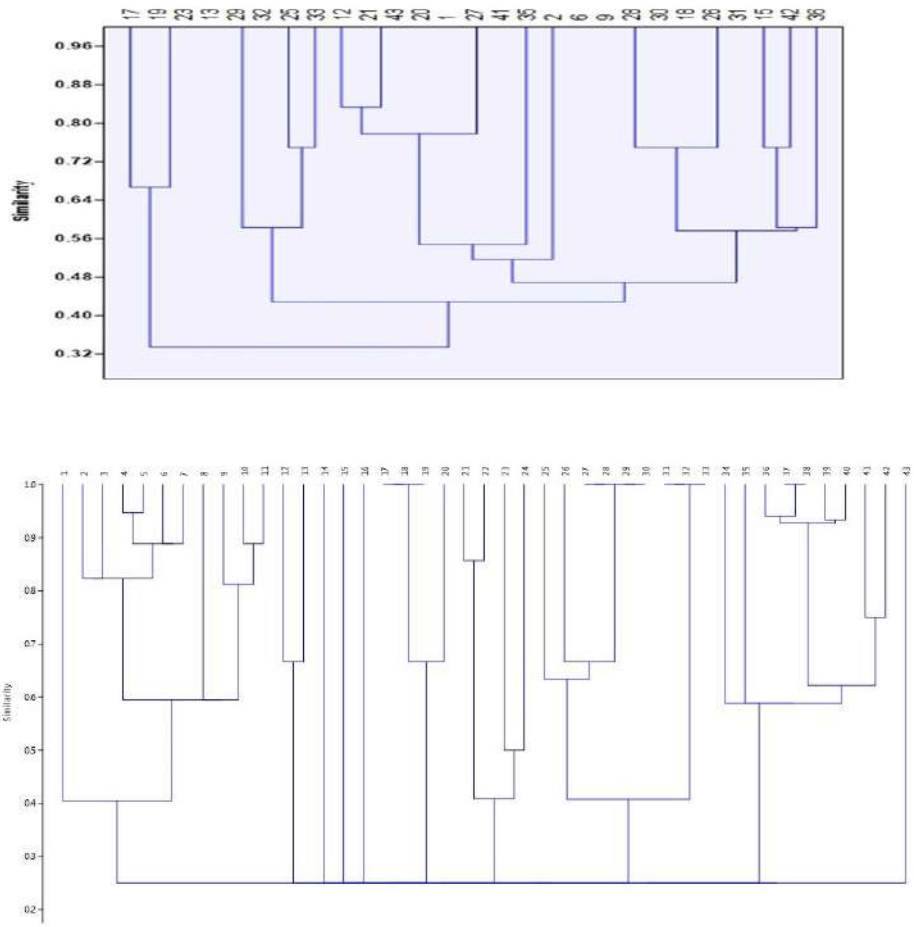

Figure 1a & b. The phylogenetic tree was built depending on antibiotic susceptibility; the isolates showed high clonal diversity

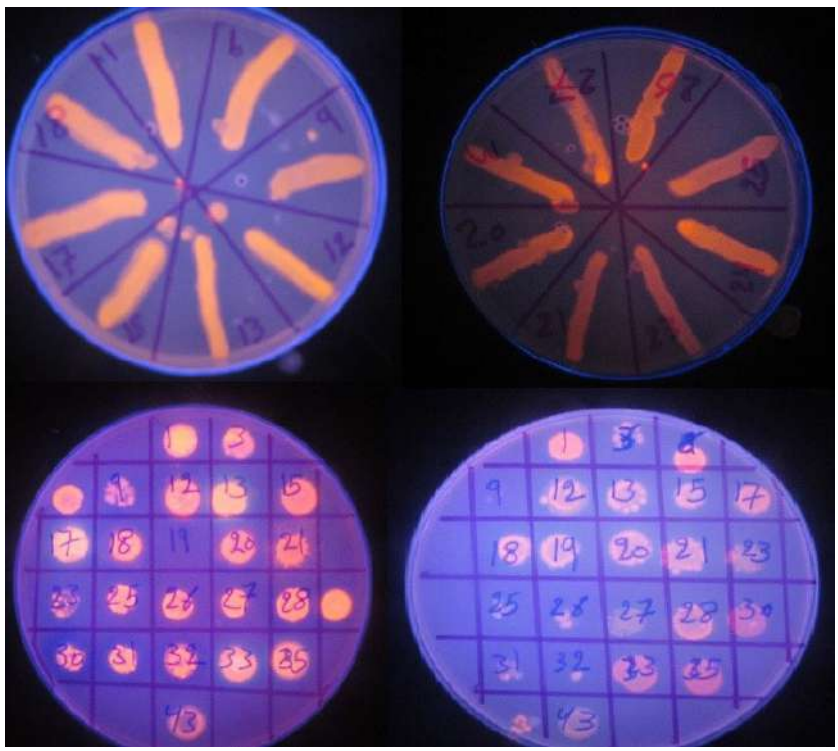

Figure 2. The presumptive overexpressed of efflux pump activity was shown by EtBr-agar cartwheel method

DISCUSSION

In the present study, results showed frequency of *K. pneumonia* isolates was in good numbers from different sources of infections. It considered as problematic organisms belong to its ability to resists different types of antibiotics including fluoroquinolones due to having several mechanisms of resistant. [2]. This study revealed that *Klebsiella* isolates harbored more than one resistance gene, [15, 16] similar to Al-Najaf city study in which it was reported that 14/34 (41.14%) of *Klebsiella* isolates harbored *aac(6)Ib* gene. In this study, the harboring percentage with this gene was up and reached 25/27(92.5%). All 25 isolates appeared resistant to Amikacin and gentamycin in a phenotypic test; the mechanism of resistance was due to modification in aminoglycoside enzymes groups. The earlier study stated [17] the predominant of this gene was common in Enterobacteriaceae. Further *aac(6)Ib* gene seems to coding resistance phenotype for gentamycin, tobramycin, kanamycin, and amikacin which explains why there is a high percentage of resistance in present in *Klebsiella pneumonia*. On the other hand, *parC* gene appeared in 20/27 (74.1%) and *gyrA* in 18/27 (66.6%) of *Klebsiella* isolates. These genes codes for resistance to quinolones which causes mutation at positions of Ser80 of parC and Ser83 of gyrA leading to high level of resistance [16, 17]. Therefore it can be said that multiple mutations in parC and/ or gyrA were required to expression high level of resistance in *Klebsiella pneumonia* [17]. Single alteration of gyrA protein may cause low-level ciprofloxacin resistance while a double mutation in gyrA protein may lead to high-level ciprofloxacin resistant. Interestingly most of the study isolates had *parC* & *gyrA* genes which explains the reason of high-level ciprofloxacin resistance. However, the eleven out of twenty-seven isolates in the current study display a single alteration in parC and gyrA genes with high-level ciprofloxacin resistance.

The tripartite complex consists of an inner membrane protein (IMP) of the resistance nodulation cell division (RND) family, outer-membrane protein (OMP) and a periplasmic membrane fusion protein (MFP) which connect the other two proteins [14]. Efflux-mediated drug resistance is more complex due to the molecular architecture of the cell envelope in gram-negative bacteria which compounds from tripartite complex outer-membrane protein OMP, inner membrane protein IMP and MFP periplasm-mic membrane fusion protein which connects between them. These belong to resistance nodulation of cell division RND family, and tripartite proteins play role in pump out antibiotics from the cell, furthermore efflux pumps of the RND family are prominent in clinically significant MDR Gram-negative bacteria [14].

Efflux systems have a critical role in the development of mechanistic drug resistance in Gram-negative bacteria, this pump solutes out of the cell, permitting microorganism to adjust their internal environment by getting out toxic substance like metabolite, antimicrobial agents and quorum sensing signal molecules. In this study, we have employed PAN, reported to be one of the first inhibitors of RND pumps. The EtBr-agar cartwheel screening method showed efflux activity in 27 strains. Also, the dendrogram showed the clustering of these isolates belong to antibiotics resistance and gene distribution in it. Our study reveals the emergence of efflux pump-mediated drug resistance in MDR Gram-negative bacteria in the Middle East, especially in Iraq.

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Conflict of Interest: Authors declare nothing to disclose

***Ethics approval and consent to participate**

This study was designed and approved by institutional ethical committee, Mustansiriyah University. All the participants gave the prior written consent for this study.

***Consent for publication**

Ethics committee has provided permission for data publication related to this study.

***Competing interests**

Authors declare nothing to declare.

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REFERENCES

1. Bilal SA, Kareem SM. Sensitivity of Bacteria

Escherichia coli Iisolated from Urinary Tract Infection toward Ciprofloxacin and Lomefloxacin. Ibn Al-Haitham Journal For Pure And Applied Science. 2011;24(2):47-61.

2. AL-Kadmy I.M.S., Musafer H.K., Abd Ali M.H., Sajid S. Detection of 16S Ribosobmal RNA Methylation in Extended-Spectrum β-lactamase-Producing *Klebsiella Pneumoniae* Clinical Isolates from Baghdad Hospitals. *Iraqi J. Biotechnology.* 2015;14(1):53-62.

3. Martínez-Martínez L., A. Pascual and G. A. Jacoby. Quinolone resistance from a transferable plasmid. Lancet. 1998; 351:797–799.

4. Tran JH, Jacoby GA. Mechanism of plasmid-mediated quinolone resistance. Proc Natl Acad Sci USA. 2002; 99:5638–42.

5. Kim H. B., Park C.H., Kim C.J., Kim E.C., Jacoby G.A. and Hooper D.C. Prevalence of Plasmid-Mediated Quinolone Resistance Determinants over a 9-Year Period. ANTIMICRO. AGE. CHEMOTHE. 2009; 53(2): 639–645.

6. Robicsek A., J. Strahilevitz G. A. Jacoby M. Macielag D. Abbanat K. Bush and D. C. Hooper. Fluoroquinolone modifying enzyme: a novel adaptation of a common aminoglycoside acetyltransferase. Nat. Med. 2006; 12:83–88.

7. Jacoby G., Strahilevitz J., and Hooper D.C. Plasmid-mediated quinolone resistance. Microbiol Spectr. 2015; 2(2).

8. Périchon B, Courvalin P, Galimand M. Transferable resistance to aminoglycosides by methylation of G1405 in 16S rRNA and to hydrophilic fluoroquinolones by QepA-mediated efflux in Escherichia coli. Antimicrob Agents Chemother. 2007; 51:2464–2469. PubMed: 17470656.

9. Venter H, Mowla R, Ohene-Agyei T and Ma S. RND-type drug efflux pumps from Gram-negative bacteria: molecular mechanism and inhibition. Front. Microbiol. 2015; 6:377. doi: 10.3389/fmicb.2015.00377.

10. CLSI. (2014). Performance standards for antimicrobial susceptibility testing; Twenty-Four informational supplement. M100-S24.vol.34 No.1

11. Costa S.S., Junqueira E., Palma C., Viveiros M., Melo-Cristino J., Amaral L. and Isabel Couto I. Resistance to Antimicrobials Mediated by Efflux Pumps in *Staphylococcus aureus*. *Antibiotics*. 2013, *2*, 83-99; doi:10.3390/antibiotics2010083.

12. Martins M, Couto I, Viveiros M, Amaral L. Identification of efflux-mediated multi-drug resistance in bacterial clinical isolates by two simple methods. Methods Mol Biol. 2010; 642:143-57.

13. AL_Jubori S.S., AL_Kadmy I.M.S. & Al_Ani Z.I.J. Emergence of Multidrug resistance (MDR) Acinetobacter baumannii hospitals. Advances in Environmental Biology. 2016, 10(5): 265-275.

14. Kim Y., Jang J., Kim H., Kim H., Lee K., Park K.S., Lee H., and Kim Y. Identification of strain 22arboring both aac(6')-Ib and aac(6')-IB-cr variant simultaneously in Escherichia coli and Klebsiella pneumonia. BMB reports. 2011, 44(4): 262-266.

15. Fàbrega A, Madurga S, Giralt E, Vila J. Mechanism of action of and resistance to quinolones. Microbial Biotech. 2009, 2:40-61.

16. Lee JK, Lee YS, Park YK, Kim BS. Mutations in the gyrA and parC genes in ciprofloxacin-resistant clinical isolates of Acinetobacter baumannii in Korea. Microbiol Immunol. 2005, 49:647-653.

17. Minarini L.A.R. & Darini A.L.C. Mutations in the quinolone resistance-determining regions of gyrA and parC in Enterobacteriaceae isolates from Brazil. Braz. J. Microbiol. 2012, 43(4): 1309-1314.

Joint Effect of Obesity and Cigarette Smoking Against Hypertension Stage 1 among Men Adults: Finding from the Indonesian Family Life Survey-5

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ABSTRACT

The association of obesity and cigarette smoking against hypertension has been known but still rarely performed a joint effect of obesity and cigarette smoking in causing hypertension stage 1. This study aims to evaluate the joint effect of obesity and cigarette smoking against hypertension stage 1 in Indonesia. This is a cross-sectional study. Subjects in this study were the age group ≥18 years old who were followed by the interview. We investigated factors related to hypertension stage 1 in Indonesia associated with obesity and cigarette smoking by controlling other confounding variables. The prevalence of hypertension stage 1 was 19.84% among participants. Multivariate analysis showed that people who smoked and obese had a 2.61 greater risk of having hypertension stage 1 compared with obese and non-smokers 2.41, and people not obese and smoking 1.18. People with obesity and smoking have a greater risk of developing hypertension stage 1. Substantial effort must be made to raise awareness about controlling blood pressure regularly and early treatment especially in people who were smoked and obese.

Keywords: *Joint Effect, Obesity, Cigarette Smoking, Hypertension Stage 1, Indonesia*

INTRODUCTION

The prevalence of hypertension will continue to increase every year and it was predicted that by 2025 as many as 29% of adults worldwide will get hypertension.[1] According to WHO 2013, there were 9.4 million deaths each year caused by hypertension, of which 1.5 million deaths occur in Southeast Asia that can cause an increase in health costs.[2] In Indonesia according to Basic Health Research (Riset Kesehatan Dasar) 2013 the prevalence of hypertension in Indonesia is 25.8%.[3]

Epidemiological studies have shown that obesity can trigger hypertension. Obesity accounts for 65-75% of the risk of primary hypertension. Increased renal tubular sodium reabsorption disrupts natriuresis pressure and plays an important role in initiating hypertension due to obesity.[4] Jiang et al study showed that obesity was a risk factor for hypertension.[5] A prospective cohort study conducted by Li et al 2017 also shows that obesity was a risk factor for hypertension with a risk of 3.34 times.[6]

In addition to obesity, there were many other factors that play a role in increasing the risk of hypertension, including smoking behavior. Smoking can cause hypertension due to chemicals contained in cigarettes that can damage the inner lining of the arterial wall, so that the arteries were susceptible to plaque accumulation. This is mainly due to nicotine which can stimulate the sympathetic nerves to make the heart work harder and cause constriction of blood vessels and increased blood viscosity.[7] Study by Li, et al (2017) on the relationship between smoking behavior and blood pressure in men in China showed that the prevalence of hypertension was higher in smokers than in people who had never smoked (OR 2.36; 95% CI: 1.67-3.34).[8] Looking at the above problems, the joint effect of obesity and smoking on hypertension stage 1 in Indonesia need to be evaluated.

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METHOD

The IFLS-5 survey procedures had been approved by Institutional Review Boards (IRBs) in the United States at Rand Corporation, Santa Monica, California and in Indonesia at Ethics Committees of Gadjah Mada University. This study uses a cross-sectional design using data from the Indonesian Family Life Survey-5.[9]

The surveys collected information on individual, household and community level data using multistage stratified random sampling. IFLS is a longitudinal household survey involving both questionnaire and anthropometric measurements, and which was collected under the supervision of the Rand Corporation. IFLS-5 was conducted in 13 provinces in Indonesia.[10]

IFLS-5 was conducted in September 2014-March 2015 on 16,204 households and 50,148 individuals.[11] The study population was the population who became the subject of IFLS-5 research in 2014. While the sample was the age group ≥18 years who followed the interview and had questionnaire data on important variables and complete blood pressure examination. Respondents who took hypertension drugs, female and were in hypertension stage 2 excluded in this study.

We include demographic information, individual characteristics and behavioral factors as confounding. We categorize the level of education completed by respondents to low, high and other levels of education, while marital status was classified as unmarried, married, or divorced. We include smoking behavior as an indicator of health risk and respondents who were categorized as not smoking and smoking.

Physical activity was assessed through a series of questions (a brief form modified from the International Physical Activity Questionnaire (IPAQ)) on the type and time of physical activity involved in, in all parts of life: work, home and exercise and then classified as sufficient and less physical activity.[12]

History of Diabetes Mellitus is assessed through questions ever diagnosed or not done by doctors or paramedics as well as a history of high cholesterol. We also measured respondents' fiber consumption in the past week, which was seen from the consumption of fruits and vegetables.

Body mass index (BMI <27 kg/m^2: normal weight; and ≥27.0 kg/m^2: obesity derived from the height and weight measured during the physical examination, these criteria were determined based on the Ministry of Health of the Republic of Indonesia in 2013. Height measured by the Seca plastic height board model 213 and weight was measured using Camry model EB1003 scale. In this study the measurement of body weight and height was carried out by the interviewer or enumerator who was competent in their field and had received previous training.

Blood pressure was measured 3 times at an individual age of ≥18 years, using Omron meter HEM 7203. The first measurement was done at the beginning of the interview with the next two steps taken during the interview. The average of the 3 measurements was used for the current analysis. According to the JNC 7 blood pressure was categorized into 4 levels, namely normal (<120 / 80mmHg), prehypertension (120-139 / 80-89 mmHg), hypertension stage 1 (140-159 / 90-99 mmHg), and hypertension stage 2 (≥160/100 mmHg). We classify respondents as hypertension stage 1 if their blood pressure 140/90 mmHg-159/99 mmHg based on the criteria of JNC 7. Blood pressure measurement was carried out by the interviewer or enumerator who was competent in their field.[13]

Only respondents with complete information and blood pressure measurements were taken 3 times and were in normotensive or hypertension stage 1 included in the analysis. Logistic regression was performed to calculate the risk in all age groups. This study includes age, education level, marital status, history of Diabetes Mellitus, history of high cholesterol, fruit and vegetable consumption and physical activity as potential confounders variables by including them in multivariable analysis between obesity and cigarette smoking to Hypertension stage 1. If there is a difference of more than 10% between POR crude and POR adjusted then these variables were considered as confounding variables and not included in the next model. The same procedure was used to estimate adjusted odds ratio (and 95% confidence interval) for hypertension stage 1.[14] Finally, the joint effect (and 95% confidence interval) of obesity and cigarette smoking, individual effect of obesity among non-smoker, and effect of smoking among non obese person on hypertension were evaluated.

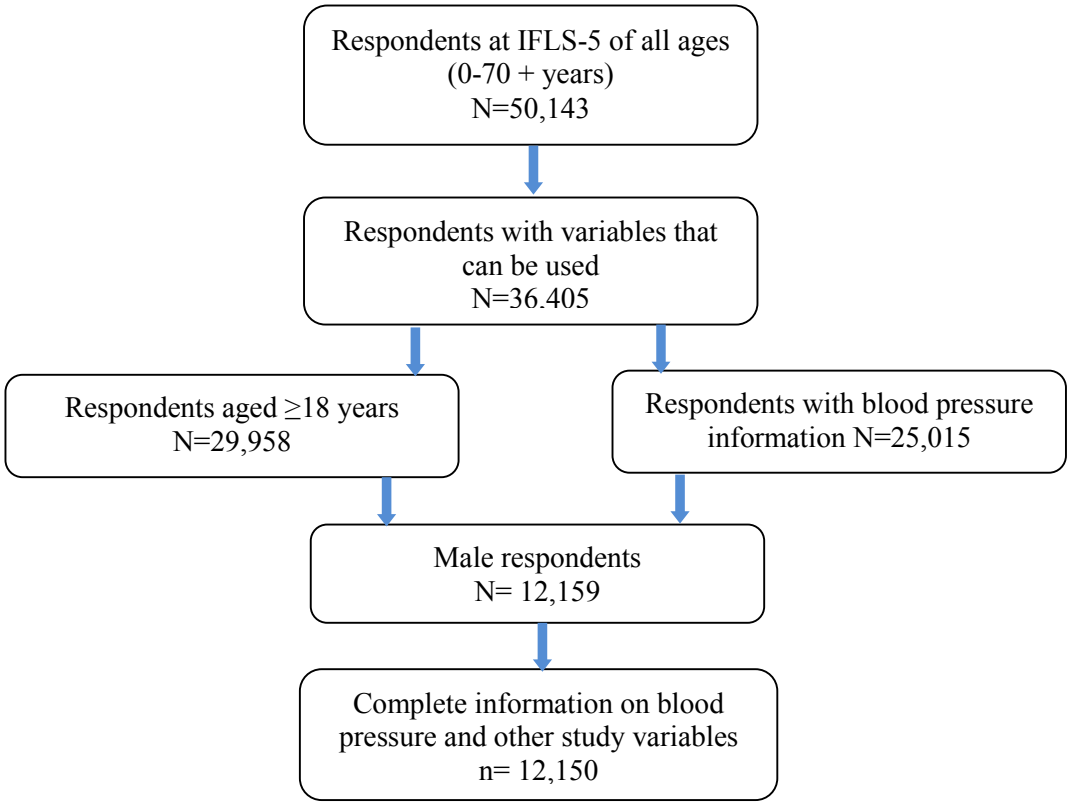

Figure 1. Selection of Study Sample Flowchart

RESULTS

The description of each study variable can see in Table 1. Of the 12,150 adult male respondents, the proportion of hypertension stage 1 in Indonesia was 19.84%. While the proportion of obesity and cigarette smoking was 18.78% and 36.43%, respectively.

Table 1. Frequency of Hypertension Stage 1 According to Individual Characteristics

Characteristics	Hypertension Stage 1		Non Hypertension		Total
	n = 2411	%	n = 9739	%	
Age Category (years)					
18-27	233	9.66	2901	29.79	3134
28-37	473	19.62	3397	34.88	3870
38-47	577	23.93	2018	20.72	2595
48-57	551	22.85	914	9.38	1465
>57	577	23.93	509	5.23	1086
Education Level					
High	829	34.38	4783	49.11	5612
Low	1531	63.50	4670	47.95	6201
Other	51	2.12	286	2.91	337
Marital Status					
Single	474	19.66	1861	19.11	2335
Married	1708	70.84	6988	71.75	8696
Divorced	229	9.50	890	9.14	1119
Diabetes Mellitus History					
Yes	91	3.77	137	1.41	228

Cont... **Table 1. Frequency of Hypertension Stage 1 According to Individual Characteristics**

No	2320	96.23	9602	98.59	11922
Physical Activity					
Enough	1463	60.68	6449	66.22	7912
Less	948	39.32	3290	33.78	4238
High Cholesterol History					
Yes	171	7.09	328	3.37	499
No	2240	92.91	9411	96.63	11651
Smoking Status					
Yes	939	38.95	3487	35.80	4426
No	1472	61.05	6252	64.20	7724
Obesity					
No (BMI <27,0)	1676	69.51	8192	84.12	9868
Yes (BMI ≥27,0)	735	30.49	1547	15.88	2282
Fruit and Vegetable Consumption					
Enough	1791	74.28	7141	73.32	8932
Less	620	25.72	2598	26.68	3218
Combination of Obesity and Smoking					
Non-obese + Non-smoking	1004	41.46	5237	53.77	6241
Obesity + Non-smoking	468	19.41	1015	10.42	1483
Non-obesity + Smoking	672	27.87	2955	30.34	3627
Obesity + Smoking	267	11.07	532	5.46	799

Note: BMI: Body Mass Index

Based on the table 1 it can be seen that the proportion of obesity is higher in hypertension stage 1 people (30.49%) than those non-hypertension (15.88%). Hypertension stage 1 at age> 57 years was higher (23.93%) than non-hypertension (5.23%), as was 48-57 years of age higher (22.85%) than non-hypertension (9.38). Hypertension stage 1 in obese and smoking people was higher (11.07%) than non-hypertension ones (5.46%). Hypertension stage 1 in low education was higher (63.50%) than non-hypertension ones (47.95%).

Table 2. Final Model Joint Effect of Obesity and Cigarette Smoking against Hypertension Stage 1

Combination of Obesity and Smoking	Hypertension Stage 1		Non Hypertension		POR (95% CI)
	n	%	n	%	
Obesity + Smoking	267	11.07	532	5.46	2.61 (2.22-3.07)
Obesity + Non Smoking	468	19.41	1015	10.42	2.41 (2.11-2.74)
Non Obesity + Smoking	672	27.87	2955	30.34	1.18 (1.06-1.32)
Non Obesity + Non Smoking	1004	41.46	5237	53.77	1.00 (Referant)

Note: Adjusted by age, education level, marital status, diabtes mellitus history, high cholesterol history, physical activity, fruit and vegetable consumption

Based on table 2, it was known the final model of the relationship of obesity and cigarette smoking to the hypertension stage 1 after being controlled for age. The risk of hypertension stage 1 of respondents classified as obese and also smoking was the largest, which was 2.61 compared to those who were not obese and did not smoke (95% CI; 2.22-3.07). While the risk of hypertension stage 1 in respondents classified as obese but not smoking was 2.41 greater than in the non-obese and non-smoking group with 95% CI; 2.11-2.74. Then, the risk of respondents who were classified as non-obese

but smoking was known to be 1.18 greater than those who were not obese and do not smoke to experience hypertension stage 1 (95% CI; 1.06-1.32).

DISCUSSIONS

Based on the results of the analysis, it was known that the combination of obesity and smoking together was a risk factor that is associated with an increase in the proportion of hypertension stage 1. The results of this study showed that the proportion of hypertension in stage 1 in respondents classified as obese and smoking was 2.61 compared to who were not obese and do not smoke. While the risk of hypertension stage 1 in respondents classified as obese but not smoked by 2.41 was greater than in the group that was not obese and does not smoke. Then, the risk of respondents who were classified as non-obese but smoking was known to be 1.18 greater than those who were not obese and do not smoke to experience hypertension stage 1.

Based on previous study, mentions a significant relationship between obesity with hypertension stage 1. The relationship of obesity has long been known and has been widely reported by many researchers, but the mechanism of the occurrence of hypertension due to obesity was not yet clear. Most researchers focus on the pathophysiology on three main things, namely autonomic system disorders, insulin resistance and abnormalities in the structure and function of blood vessels. These three things can influence each other.[15]

Weight loss was the most instrumental element in the prevention and treatment of hypertension. Hypertension patients were encouraged to lose weight if they were obese and this will affect blood pressure.[16] Every 1 kg of weight gain had Hazard Ratio to suffer from hypertension at 1.36 (95% CI: 1.29-1.45).[17] In addition, based on the results of previous studies showed that every kilogram of weight loss can reduce systolic blood pressure by 1.05 mmHg and diastolic by 0.92 mmHg.[18]

The results of this study also showed that obesity has a significant relationship with the hypertension stage 1. The results of bivariate analysis showed that respondents who were obese (BMI> 25) were at risk 2,008 times (95% CI: 1.261-3.198) to suffer from hypertension stage 1 compared to respondents who were not obese. So that there was a large relationship of obesity with hypertension stage 1 which is 1.681 times (95% CI: 1.049-2.696), meaning that respondents with obesity have a risk of 1.681 times to suffer from hypertension stage 1 compared to those who were not obese after controlled age variables, history of diabetes mellitus and physical activity.[19]

According to WHO recommendations, a person was declared hypertension, it needs to be re-evaluated about 1 or 2 weeks. However, in this study only assessed at one time (only implemented once), so that the possibility can lead to a measurement bias. To minimize bias measurement of hypertension stage 1 variable, among others, by measuring blood pressure carried out by trained medical personnel and determining the diagnosis of hypertension was done by a doctor. In addition, routine calibration was carried out against tensimeters before use.

CONCLUSIONS

The proportion of hypertension stage 1 in Indonesia who became respondents in IFLS-5 is 19.84%. The combination of obesity and cigarette smoking have a risk of 2.61 times to suffer from hypertension stage 1 compared to those who not obese and not smoking. Obesity and cigarette smoking together show a greater association with hypertension stage 1 than obesity or smoking alone. Given the high prevalence of hypertension it was necessary to increase health promotion efforts including the addition of nutrition counseling and counseling as well as joint sports activities (gymnastics) in integrated coaching activities. The government and all health workers were more optimizing the implementation of Integrated Non-Communicable Disease Development Post. Communities, especially those classified as high-risk (obesity and cigarette smoking) can realize the importance of independently performing hypertension stage 1 screening in this case was general obesity of body weight and height, and smoking as a first and foremost step to prevent the emergence of the incidence of hypertension stage 1.

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REFERENCES

1. WHO. Global status report on noncommunicable diseases. 2011.
2. WHO. A global brief on hypertension. 2013.
3. Ministry of Health RI. Basic Health Research. Jakarta: National Institute of Health Research and Development Minstry of Health RI. 2013.
4. Hall JE et al. Obesity-induced hypertension: Interaction of neurohumoral and renal mechanisms. Circ Res. 2015; 116 (6): 991–1006.
5. Jiang SZ et al. Obesity and hypertension. Exp Ther Med. 2016; 12 (4): 2395–9.
6. Li R et al. Prospective cohort study to elucidate the correlation between occupational stress and hypertension risk in oil workers from kelamayi city in the xinjiang uygur autonomous region of China. Int J Environ Res Public Health. 2017; 14 (1).
7. Xiu X et al. Nicotine binding to brain receptors requires a strong cation- interaction. Nature. 2009; 458 (7237): 534–7.
8. Li G et al. The association between smoking and blood pressure in men: A cross-sectional study. BMC Public Health. 2017; 17 (1): 1–6.
9. RAND. Indonesian Family Life Survey (IFLS). 2015. Available from: https://www.rand.org/labor/FLS/IFLS/ifls5.html.
10. RAND Corporation. The Indonesian Family Life Survey (IFLS) Santa Monica [Internet]. California; 2014. Available from: http://www.rand.org/labor/FLS/IFLS.html.
11. Strauss J, Witoelar F, Sikoki B. The Fifth Wave of the Indonesia Family Life Survey: Overview and Field Report: Volume 1. 2016; 1 (March): 94. Available from: http://www.rand.org/pubs/working_papers/WR1143z1.html.
12. IPAQ. Guidelines for Data Processing and Analysis of the International Physical Activity Questionnaire (IPAQ) Short and Long Forms, revised on November 2005. Ipaq. 2005; (November): 1–15. Available from: https://sites.google.com/site/theipaq/scoring-protocol.
13. JNC 7. National high blood pressure education program coordinating committee. The seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: the JNC 7 report. JAMA. 2003; 289: 2560–71.
14. Greenland S dan Rothman KJ. Fundamentals of epidemiologic data analysis. Modern epidemiology. Philadelphia: Lippincott Williams & Wilkins; 2008. pp.219.
15. Haris S and Tambunan T. Hypertension in metabolic syndrome. Sari Pediatri. 2009; 11 (4): 257–63.
16. Richard NR. Obesity-related hypertension. Ochsner J. 2009; 9: 133–6.
17. Juhaeri et al. Associations between weight gain and incident hypertension in a bi-ethnic cohort: The atherosclerosis risk in communities study. Int J Obes. 2002; 26 (1): 58–64.
18. Radjab DA. Lifestyle modification and blood pressure. Maj Kedokt Indones. 2007; 57 (13).
19. Sari D. Relationship central obesity with the incidence of hypertension stage 1 at Posbindu PTM in Padang City in 2011. Thesis. University of Indonesia; 2011.

Comparison of Various Obesity Indices Against the Occurrence of Stage 1 Hypertension in Indonesia

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ABSTRACT

Background: Hypertension is one of the most important causes of premature death worldwide. Several studies had explored which obesity indices were more strongly associated with hypertension but the results were still varies. This study aimed to compare various obesity indices that has more strongly associated with stage 1 hypertension in Indonesia.

Method: A total of 8240 respondents aged 40-69 years were investigated. Design of the study was a cross sectional using data from Indonesian Family Life Survey (IFLS) round 5 in 2014. Cox regression was applied for the analysis.

Results: Prevalence of stage 1 hypertension among the study participants was 25.98%. The obesity indice that showed the strongest association with stage 1 hypertension in both men and women was WHtR (PR 1.89, 95% CI 1.73-2.07). After stratified by sex, the obesity indices that showed the strongest association in men was WC (PR 1.73, 95% CI 1.53-1.97) while in women was WHtR (PR 1.76, 95% CI 1.5-2.05).

Conclusion: WHtR performed better than BMI, WC, WHR for predicting the occurrence of stage 1 hypertension across sexes. WC was the best obesity indice in men while in women was WHtR. The appropriateness of selection obesity indices helps in maximizing screening for the occurrence of stage 1 hypertension.

Keywords : *stage 1 hypertension, obesity, BMI, WC, WHR, WHtR*

INTRODUCTION

Hypertension is one of the most important causes of premature death worldwide. Hypertension is responsible for at least 45% of deaths due to heart disease and 51% of deaths due to stroke [1]. Hypertension kills nearly 8 million people every year in worldwide and nearly 1.5 million people each year in the South-East Asia (SEA) Region. Approximately one-third of the adult population in the SEA Region has high blood pressure, and in 2025, an estimated 1.56 billion adults will be living with hypertension [2]. Based on Basic Health Research (Riskesdas) in 2013, prevalence of hypertension in Indonesia is 25,8% [3].

Obesity had been well recognized as the wide health risks including hypertension [4]. Many studies showed that the high incidence of hypertension was associated with increasing prevalence of obesity [5,6]. Data from *World Health Organization* (WHO) in 2016 estimated that more than 650 million adults in worldwide were obese [7]. Obesity can be defined by different anthropometric indices. Body mass index (BMI) is commonly used in many epidemiologic studies on obesity, however it was criticized for measuring body fat distribution inefficiently especially abdominal fat mass [8-10]. Some studies found statistical evidence that supports the superiority of measuring abdominal fat mass over BMI were using waist circumference (WC), waist-to-hip-ratio (WHR), waist-to-height-ratio (WHtR) [11-12].

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Some studies had explored which obesity indices are more strongly associated with hypertension but the capability of these obesity indices in predicting the hypertension risks still was debated. Study of Qian Wang et al reported that BMI was the best obesity indices for predicting hypertension in both men and women [8]. A prospective cohort study by Joung Won Lee et al revealed that WHtR in women and WC in men had the strongest association with hypertension [13]. But study of Nyamdorj et al indicated that BMI, WC, and WHR had the same association with hypertension in both men and women [14].

Due to difference of previous study results, this study aimed to compare various obesity indices that has more strongly associated with stage 1 hypertension in Indonesia and find out its possible sex differences.

METHOD

Ethical Consideration

This study used Indonesian Family Life Survey (IFLS) round 5. The IFLS survey procedures had been reviewed and approved by Institutional Review Boards (IRBs) in the United States (at Rand Corporation, Santa Monica, California) and in Indonesia (Ethics Committees of Gadjah Mada University, Yogyakarta). Informed consent was obtained from all respondents before data collection was carried out.

Study Design and Participants

This study was an analytic observational study with a cross sectional design. This study used data from Indonesian Family Life Survey (IFLS) round 5. Data collection was conducted in 13 provinces in Indonesia in late 2014 and early 2015: 16.204 households and 50.148 individuals were interviewed [15].

The study population in this study were respondents aged 40-69 years and participated in IFLS 5. The study sample was all respondents who met the inclusion and exclusion criteria. Inclusion criteria in this study were respondents aged 40-69 years and had complete blood pressure measurement, anthropometric, and interview data. While the exclusion criteria were respondents who were taking hypertension medication, were pregnant, had stage 2 hypertension, and had incomplete blood pressure measurement, anthropometric, and interview data.

At first there were 11.440 respondents aged 40-69 years, but as many as 2.152 respondents suffered from stage 2 hypertension, 358 respondents were taking hypertension medication, and 691 respondents had incomplete data so they could not be included in the study. The number of respondents who could be analyzed in this study were 8.240.

Data Collection

The dependent variable measured in this study was stage 1 hypertension. Blood pressure were obtained from the average results of three measurements and classified according to Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure 7 (JNC 7) guidelines. Respondents suffered stage 1 hypertension if they had systolic blood pressure 140-159 mmHg and/or diastolic blood pressure 90-99 mmHg [16]. Blood pressure measurements using digital Omron sphygmomanometers type HEM-7203 and performed by trained interviewer.

The independent variables measured were obesity indices (BMI, WC, WHR, and WHtR). BMI was calculated by comparing body weight with height squared (kg/m^2). BMI was classified based on WHO standards for asian adults and obese was a BMI ≥ 25 kg/m^2 [17]. Measurement of weight using a digital Camry scale model EB1003 that can measure to the nearest tenth of a kilogram. Height measurement using Seca plastic height board that can measure heights to the nearest millimeter. This measurements was carried out by trained interviewer.

WC is a measure of waist circumference at the midpoint between the lower border of the rib cage and the end point of the arch of the pelvic bone. The cut off points used in accordance with WHO standards for asian adults, it was chosen as a WC in women ≥ 80 cm for women and ≥ 90 cm for men [17].

WHR was calculated as waist circumference divided by hip circumference. The cut off points used in accordance with WHO standards for asian adults, it was considered as a WHR ≥ 0.85 for women and WHR ≥ 0.90 for men [18]. Measurement of waist circumference and hip circumference using a measuring tape that can measure to the nearest millimeter.

WHtR was calculated as WC divided by height. The cut off points was considered ≥ 0.5 for both women and

men [19].

We collected demographical characteristics of respondents by performing interview using structured questionnaire and conducted by trained interviewer. Respondent data collection included sex (male, female), education level (low, high), smoking status (current smoker, ex-smoker, nonsmoker), physical activity according to the International Physical Activity Questionnaire / IPAQ standard (low/<600METs, medium/600-3000METs, high/>3000 METs), and vegetables and fruits consumption during the last week (less, enough).

Data Analysis

Multivariate analysis was used to estimate the risk of stage 1 hypertension based on BMI, WC, WHR, WHtR after being adjusted by covariate variables. This study used multivariate analysis with modified cox regression. The use of modified cox regression was carried out to obtain an estimate of prevalence ratio (PR) and 95% confidence interval (CI) [20]. Covariate variables used in multivariate analysis were age, education level, smoking status, physical activity, and vegetables and fruits consumption. Statistical testing for confounders was done by comparing the PR crude with PR adjusted. If the PR difference was more than 10% then the variable was a confounder.

RESULTS

The study revealed that 2.141 (25.98%) respondents had suffered stage 1 hypertension (table 1). The proportion of stage 1 hypertension were higher in those aged 60-69 (28.43%), male (30.73%), had low education level (28.57%), ex-smoker (48.52%), had high physical activity (28.23%), less in consuming vegetables and fruits (39.35%), obese based on BMI (34.05%), obese based on WC (34.61%), obese based on WHR (33.24%), and obese based on WHtR (37.34%).

Table 1. Proportion of Stage 1 Hypertension Based On Demographical Characteristic

Variables	Stage 1 Hypertension		No Hypertension	
	n = 2141	%	n = 6099	%
Age (years)				
60 – 69	294	28.43	740	71.57
50 – 59	635	26.32	1778	73.68
40 – 49	1212	25.29	3581	74.71
Sex				
Female	860	21.12	3212	78.88
Male	1281	30.73	2887	69.27
Education Level				
Low	1009	28.57	2523	71.43
High	1132	24.04	3576	75.96
Smoking Status				
Current Smoker	941	31.36	2060	68.64
Ex-smoker	246	48.52	261	51.48
Non Smoker	954	20.16	3778	70.84
Physical Activity				
Low	750	25.51	2190	74.49
Medium	1310	26.16	3698	73.84
High	81	27.74	211	72.26
Vegetables and Fruits Consumption				
Less	874	39.35	1347	60.65
Enough	1267	21.05	4752	78.95

Cont... **Table 1. Proportion of Stage 1 Hypertension Based On Demographical Characteristic**

BMI				
Obese (≥25 kg/m^2)	1210	34.05	2344	65.95
Non Obese (<25 kg/m^2)	931	19.87	3755	80.13
WC				
Obese (♂ ≥90 cm, ♀≥80 cm)	1381	34.61	2609	65.39
Non Obese (♂ <90 cm, ♀<80 cm)	760	17.88	3490	82.12
WHR				
Obese (♂ ≥0.9, ♀≥0.85)	1181	33.24	2372	66.76
Non Obese (♂ <0.9 cm, ♀<0.85)	960	20.48	3727	79.52
WHtR				
Obese (≥0.5)	1303	37.34	2187	62.66
Non Obese (<0.5)	838	17.64	3912	82.36

Multivariate adjusted estimates were shown in table 2, table 3, and table 4. After being adjusted by covariate variables, the obesity indice that showed the strongest association with stage 1 hypertension in both men and women was WHtR (table 2). Men and women who were obese based on WHtR were 1.89 times more likely to have risk of stage 1 hypertension in comparison to men and women who were not obese (PR 1.89, 95% CI 1.73-2.07).

When stratified by sex, the obesity indice that showed the strongest association in men was WC (table 3). Men who were obese based on WC were 1.73 times more likely to have risk of stage 1 hypertension in comparison to men who were not obese (PR 1.73, 95% CI 1.53-1.97). In women, the obesity indice that showed the strongest association was WHtR (table 4). Women who were obese based on the WHtR were 1.76 times more likely to have risk of stage 1 hypertension in comparison to women who were not obese (PR 1.76, 95% CI 1.5-2.05). Among of four obesity indices, WHR showed the weakest association in both men and women.

Table 2. Comparison of Adjusted Prevalence Ratio of Stage 1 Hypertension Based On BMI, WC, WHR, WHtR In Both Men And Women

Obesity Indices	**Stage 1 Hypertension n (%)**	**No Hypertension n (%)**	**Adjusted PR* (95% CI)**
BMI			
Obese	1210 (34.05)	2344 (65.95)	1.64 (1.50 – 1.79)
Non Obese	931 (19.87)	3755 (80.13)	1
WC			
Obese	1381 (34.61)	2609 (65.39)	1.76 (1.61 – 1.93)
Non Obese	760 (17.88)	3490 (82.12)	1
WHR			
Obese	1181 (33.24)	2372 (66.76)	1.49 (1.36 – 1.65)
Non Obese	960 (20.48)	3727 (79.52)	1
WHtR			
Obese	1303 (37.34)	2187 (62.66)	1.89 (1.73 – 2.07)
Non Obese	838 (17.64)	3912 (82.36)	1

*Adjusted for age, education level, smoking status, physical activity, vegetables and fruits consumption

Table 3. Comparison of Adjusted Prevalence Ratio of Stage 1 Hypertension Based On BMI, WC, WHR, WHtR In Men

Obesity Indices	Stage 1 Hypertension n (%)	No Hypertension n (%)	Adjusted PR* (95% CI)
BMI			
Obese	836 (35.02)	1551 (64.98)	1.63 (1.45 – 1.84)
Non Obese	420 (23.58)	1361 (76.42)	1
WC			
Obese	918 (36.94)	1567 (63.06)	1.73 (1.53 – 1.97)
Non Obese	338 (20.08)	1345 (79.92)	1
WHR			
Obese	857 (35.04)	1589 (64.96)	1.55 (1.37 – 1.74)
Non Obese	379 (22.27)	1323 (77.73)	1
WHtR			
Obese	851 (37.34)	1428 (62.66)	1.65 (1.47 – 1.87)
Non Obese	405 (21.44)	1484 (78.56)	1

*Adjusted for age, education level, smoking status, physical activity, vegetables and fruits consumption

Table 4. Comparison of Adjusted Prevalence Ratio of Stage 1 Hypertension Based On BMI, WC, WHR, WHtR In Women

Obesity Indices	Stage 1 Hypertension n (%)	No Hypertension n (%)	Adjusted PR* (95% CI)
BMI			
Obese	935 (38.19)	1513 (61.81)	1.56 (1.37 – 1.76)
Non Obese	357 (21.98)	1267 (78.02)	1
WC			
Obese	938 (38.35)	1508 (61.65)	1.45 (1.25 – 1.69)
Non Obese	354 (21.77)	1272 (78.23)	1
WHR			
Obese	324 (29.27)	783 (70.73)	1.38 (1.15 – 1.64)
Non Obese	581 (19.46)	2404 (80.54)	1
WHtR			
Obese	925 (38.00)	1509 (62.00)	1.76 (1.52 – 2.05)
Non Obese	367 (22.41)	1271 (77.59)	1

*Adjusted for age, education level, smoking status, physical activity, vegetables and fruits consumption

DISCUSSION

This study analyzed various obesity indices in relation to stage 1 hypertension. BMI was an indicator of general obesity while other obesity indices such as WC, WHR, WHtR more indicated the condition of abdominal obesity.

The results of this study indicated an obesity indice that had the strongest association with stage 1 hypertension in both men and women was WHtR. Studies done by Saeed et al and Norfazilah et al stated that WHtR was the best obesity indice in relation to stage 1 hypertension in both men and women adults population [21-22]. Meta-analysis conducted by Ashwell et al and Savvas et all also concluded that WHtR was better indice for predicting cardiometabolic risk compared to BMI [23-24].

This study also analyzed the association of various obesity indices with stage 1 hypertension based on sex. The obesity indice that showed the strongest association

in men was WC while in women was WHtR. These findings supported the results of a prospective cohort study conducted by Young Won Lee et al. Study of Young Won Lee et al that carried out in a population of men and women aged 40-69 years founded that WHtR has the strongest association with stage 1 hypertension in women and in men indicated by WC [14].

Obesity is not only about the amount of fat but also about its distribution. Abdominal or visceral fat is associated with cardiometabolic risk including hypertension [17]. WC can describe the accumulation of visceral fat. Accumulation of visceral fat can have metabolic consequences such as increased production of liver fat and increased insulin. Hyperinsulin causes the body to retain sodium and water so that blood volume increases. Excess volume of water in the body causes increased cardiac output and results in hypertension [25-26].

In general, height has usually been shown to have inverse associations with cardiometabolics morbidity and motality and this is probably because height as well as having a major genetic component, can also reflect general early life exposures [27-28]. A recent report from Chile proposes that adverse environmental exposures in critical growth periods in early life programme short stature and predisposition to abdominal adiposity, insulin resistance and other cardiometabolic risk factors in adult life [29].

Among of four obesity indices, WHR showed the weakest association in both men and women. WHR is associated with visceral fat but cannot be used to predict accurately changes in visceral fat. This is because the hip circumference is only affected by subcutaneous fat, so the accuracy of WHR in measuring visceral fat decreases with increasing body subcutaneous fat [30].

This study used a cross sectional study design so that there was no clear temporal time relationship. In addition, not all variables were examined so that they were still unable to explain thoroughly about other risk factors related to the association of obesity with stage 1 hypertension.

Obesity indices can be used to screen the occurrence of stage 1 hypertension. The appropriateness of selection obesity indices helps in maximizing detection or discovery of stage 1 hypertension patients and provides the best measurement for stage 1 hypertension prevention and control programs.

CONCLUSION

The obesity indice that had the strongest association with stage 1 hypertension in both men and women was WHtR. After stratified by sex, the obesity indices that showed the strongest association in men was WC while in women was WHtR. Obesity indices can be used to screen the occurrence of stage 1 hypertension. The appropriateness of selection obesity indices helps in maximizing detection or discovery of stage 1 hypertension patients and provides the best measurement for stage 1 hypertension prevention and control programs.

Conflict of Interest: Both author declared that no conflict interest.

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REFERENCES

1. WHO. A global brief of hypertension. 2013
2. WHO. Hypertension Fact Sheet. 2011
3. Ministry of Health, Republic of Indonesia. Basic Health Research (Riskesdas) 2013. 2013. Jakarta. pp.9
4. Foussas S. Obesity and acute coronary syndromes. Hellenic J Cardiol 2016; 57:63-4
5. Genelhu, V.A,; Celoria, B.M.; Duarte, S.F.; Cabello, P.H.; Francischetti, E.A. Not all obese subjects of multiethnic origin are at similar risk for developing hypertension and type 2 diabetes. Eur.J.Intern.Med. 2009;20: 289-295
6. Hall, J.E. The kidney, hypertension, and obesity. AHA Journal. 2003; 41: 625-633
7. WHO. Obesity and overweight fact sheet. 2018
8. Qian Wang, Lingzhong Xu, Jiajia Li, Long Sun, Wenzhe Qin, Gan Ding, Jing Zhu, Jiao Zhang, Zihang Yu, Su Xie. Association of anthropometric indices of obesity with hypertension in chinese elderly. Int. J. Environ. Res. Public Health. 2018;15:

801

9. Cho, Y.G.; Song, H.J.; Kim, J.M.; Park, K.H.; Paek, Y.J.; Cho, J.J; Caterson, I.; Kang, J.G. The estimation of cardiovascular risk factor by body mass index fat percentage in korean male adults. Metabolism. 2009;58: 765-771
10. Despres JP. Body fat distribution and risk of cardiovascular disease: an update. Circulation. 2012;126: 1301-13
11. Lee, C.M.; Huxley, R.R.; Wildman, R.P.; Woodward, M. Indices of abdominal obesity are better discriminators of cardiovascular risk factors than BMI: a meta anaylis. J. Clin. Epidemiol. 2008;61: 646-653
12. Dobbelsteyn, C.J.; Joffres, M.R.; MacLean, D.R.; Flowerdew, G. A comparative evaluation of waist circumference, waist to hip ratio and body mass index as indicators of cardivascular risk factors. The canadian heart health surveys. Int. J. Obes. Relat. Metab. Disord. 2001;25: 652-661
13. Joung Won Lee, Nam Kyoo Lim, Tae Hwa Baek, Sung Hee Park, Hyun Young Park. Anthropometric indices as predictors of hypertension among men and women aged 40–69 years in the Korean population: the Korean Genome and Epidemiology Study. BMC public health. 2015;15: 140
14. Decoda study, G.; Nyamdorj, R.; Qiao, Q.; Lam, T.H.; Tuomilehto, J.; Ho, S.Y.; Pitkaniemi, J.; Nakagami, T.; Mohan, V.; Janus, E.D.; et al. BMI compared with central obesity indicators in relation to diabetes and hypertension in Asians. Obesity. 2008;16: 1622-1635
15. RAND. Indonesian Family Life Survey (IFLS). 2015. Available from: https://www.rand.org/labor/FLS/IFLS/ifls5.html
16. National Institutes of Health National Heart, Lung, and Blood Institute. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. 2003
17. WHO. The Asia pacific perspective: redefining obesity and its treatment. 2000 pp.17-20
18. WHO. Report of a WHO expert consultation: waist circumference and waist-hip ratio. 2008 pp.27
19. Ashwell, M. Charts based on body mass index and wait to height ratio to assess the health risks of obesity: a review. The open obesity journal, 2011;3: 78-84
20. Breslow NE. Covariance analysis of censored survival data. Biometrics 1974;30: 89-99
21. Saeed Abdalla A, Al Hamdan Nasser A. Anthropometric risk factors and predictors of hypertension among Saudi adult population. Journal of epidemiology and global helath. 2013;3: 197-204
22. Norfazilah A, Juliana MS, Azmawati, MN. Sex differences in correlates of obesity indices and blood pressure among malay adults in selangor Malaysia. South African family practice. 2015;57(4):277-281
23. Ashwell, Margaret & Gunn, Pippa & Gibson, Sigrid. Waist-to-height ratio is a better screening tool than waist circumference and BMI for adult cardiometabolic risk factors: Systematic review and meta-analysis. Obesity reviews : an official journal of the International Association for the Study of Obesity. 2011;13: 275-86
24. Savvas Savva, Demetris Lamnisos, Anthony Kafatos. Predicting cardiometabolic risk: waist-to-height ratio or BMI. A meta-analysis. Diabetes Metab Syndr Obes. 2013; 6: 403–419
25. Faulkner JL, Chantemele EJB. Sex differences in mechanism of hypertension associated with obesity. AHA Journal. 2017;71: 15-21
26. Florentino RF. The burden of obesity in Asia : challenges in assessment, prevention and management. Asia Pasific J Clin Nutr 2002;11(Suppl): S676-80
27. Langenberg C, Shipley MJ, Batty GD, Marmot MG. Adult socioeconomic position and the association between height and coronary heart disease mortality: findings from 33 years of follow up in the Whitehall study. Am J Public Health 2005;95: 628-632
28. Barker DJ, Osmond C, Golding J. Height and mortality in the countries of England and wales. Ann Hum Biol 1990;17: 1-6
29. Koch E, Romero T, Romero CX et al. Early life and adult socioeconomic infulences on mortality risk: preliminary report of a pauper rich paradox in a Chilean adult cohort. Ann Epidemiol 2010;20: 487-492
30. Ayu AA, Widyastuti N, Candra A. Association of obesity indicators and blood pressure in early adult women. Journal of Nutrition College. 2017;6: 219-225.

The Status of Lipid Peroxidation System in Erysipelas Patients on the Background of Diabetes Mellitus

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ABSTRACT

Background. The erysipelas develops quite rapidly. This infectious disease is characterized by skin inflammation caused by streptococcus. Its progressiveness depends on many factors. The presence of diabetes occupying a leading place in the system of vascular events is one of the most significant factors. In this regard, this article studies the status of a lipid peroxidation system in erysipelas patients on the background of diabetes mellitus.

Methods. The experiment was conducted in the Center for Prevention and Control of AIDS and Infectious Diseases (Kabardino-Balkar Republic, Nalchik city). There were two groups participating in the experiment: the first group consisted of 20 erysipelas patients; the second one – of 14 patients, whose erysipelas developed on the background of diabetes mellitus. All patients were taking tablets.

Result. As a result of the experiment, it turned out that lipid peroxidation occurs in biological membranes during the period of erysipelas. This is manifested by an increase in blood MDA level, as well as by a deficit of antioxidant protection and a decrease in the plasma antioxidant (ceruloplasmin).

Conclusion. Recorded changes in considered parameters were more pronounced and returned to normal after treatment on the unfavorable premorbid background – such a serious disease as diabetes mellitus.

Keywords: *ergotism (St.Anthony's fire); diabetes mellitus; antioxidant system; ceruloplasmin level; endointoxication.*

INTRODUCTION

Despite a large number of works devoted to various aspects of erysipelas: pathogenic mechanism, clinical picture, diagnosis, treatment and prevention, it remains one of the most common human infectious diseases. Erysipelas is the fourth most common disease among infectious pathologies and brings great socioeconomic damage[1-2].

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The incidence of erysipelas is on average 12-20 per 10 thousand people in Russia[3-7], and 4.3 per 10 thousand people in Europe[8-10]. There are often recurrent attacks of a disease complicated by necrosis and purulent processes in the tissues and leading to elephantiasis and disability.

The course and consequences depend on the background diseases that lead to degenerative changes in tissues, microcirculation disorders, and result in a violation of skin trophism and lymph circulation. Diabetes mellitus occupying a leading place in the system of vascular events is serious risk factor for disease development. Diabetes mellitus as a background disease significantly worsens the course of and prognosis for erysipelas, promotes recurrence and the emergence of purulonecrotic events. According to published data, erysipelas patients have mainly type 2 diabetes. This

endocrine pathology is found in 8-12% of erysipelas patients, 1/4-1/3 whereof are patients, whose diabetes was first diagnosed when the erysipelas occurred[11-13].

According to the metabolic theory, microvascular complications are caused by long-term hyperglycemia and metabolic disorders induceed by it: non-enzymatic glycation of proteins, oxidative and carbonyl stress, direct glucotoxicity, glycosaminoglycan synthesis disruption. The increased aggregability and reduced deformability of erythrocytes led to an increase in blood viscosity that makes it more difficult for blood to flow. This plays an important role in vascular events development[12].

Normal performance of cellular and subcellular membranes depends on the integrity of their phospholipid structures. Damaged lipid membrane is a stage of necrotic cell death at many pathological processes, including those associated with changes in blood viscosity. As a rule, it is associated with activated lipid peroxidation in biological membranes (LPO)[14].

Usually, LPO in tissues is measured by the amount of malondialdehyde (MDA) or other products giving a characteristic coloration in combination with thiobarbituric acid (TBA)[15].

LPO is required for the formation of steroid hormones, inflammatory mediators, cytokines and thromboxanes. If the number of chemical reaction data exchange products exceeds the allowable value and peroxides damage the cell organelles, disrupt the synthesis of DNA and proteins, an antioxidant system that reduces the amount of free oxygen radicals and metal ions with variable valence comes into function. Metabolic LPO products can accumulate in tissues and body fluids if the antioxidant system does not manage to utilize them at the required rate[16].

The antioxidant system containing catalase, ceruloplasmin, vitamins E and C, beta-carotene and other components stands against the the damaging effect of LPO products and active oxygen radicals[17].

Ceruloplasmin (CP) is the main antioxidant of blood. It binds superoxide radicals and prevents LPO in cell membranes[18]. Catalase is also an important element of body's antioxidant defense, as it catalyzes the two-electron reduction of hydrogen peroxide to H_2O[19]. The pressing task is to study how the status indicators of pro- and antioxidant systems change in case of erysipelas on the background of such an unfavorable factor as diabetes mellitus.

The purpose of this research is to study the status of the lipid peroxidation system in erysipelas patients on the background of diabetes mellitus.

MATERIALS AND METHOD

The research was carried out in the Center for Prevention and Control of AIDS and Infectious Diseases (Kabardino-Balkar Republic, Nalchik city). The patients were divided into 2 groups: 1 group – 20 erysipelas patients (13 women and 7 men aged 45-68); 2 group – 14 patients, whose erysipelas developed on the background of type 2 diabetes mellitus (8 women and 6 men aged 48-70). These patients were taking tablets. They all had a chronic recurrent course of erythematous-bullous form of erysipelas of medium severity. The disease often occurred on legs – only 2 patients had erysipelas manifestations on the face. The control group involved 25 healthy people that match the subjects by sex and age.

Besides the general examination, we have activated LPO in patients to a certain degree according to the number of TBA reactive substances by determining the MDA content based on the method introduced in[20]. The antioxidant protection was assessed by measuring the CP level in blood plasma using the Ravin's method[21]. We have examined patients that had acute disease episode (when they were hospitalized) and blanching symptoms (5-7 days of hospitalization), as well as early recovered (before discharge from the hospital) and late recovered (in a month after discharge) patients.

All measurements were made with a SF-46 spectrophotometer. The results were statistically processed with Statistics program.

Table 1: Blood MDA level in erysipelas patients depending on a disease period (μmol/L)

Group	Period	n	X±m	P	P1
Healthy	-	25	1.3 ± 0.08	-	-
Erysipelas	I	34	3.7 ± 0.12	<0.001	-
	II	34	2.9 ± 0.17	<0.001	<0.001
	III	34	1.7 ± 0.08	>0.05	<0.001
	IV	18	1.4±0.26	>0.05	>0.05

Note: I – acute period; II – blanching period; III – early recovery; *I*V – late recovery; P – reliability of differences in relation to healthy people; P1 – reliability of differences in relation to the previous period; P2 – reliability of differences in relation to indicators recorded in erysipelas patients without diabetes mellitus in the corresponding period

In the examined patients, we have found a significant increase in MDA level in serum with a maximum value in the acute period (3.7±0.12 μmol/L, P<0.001). These changes have occurred on the background of basic clinical manifestations of a disease – weakness and fever, and at the height of local disease manifestations. In the blanching period, there was a significant decrease in MDA level as a result of the treatment. However, it still remained higher than in healthy people (2.9±0.17 μmol/L, P<0.001, P1<0.001). In the period of early recovery, the measured index has significantly decreased (1.7±0.08 μmol/L, P>0.05, P1<0.001) and returned to normal (Table 1).

We have measured the CP level at 3 disease periods to assess the status of the antioxidant system in the same group of patients (where the MDA level was measured); CP level at the 4 period was measured only in some patients.

Table 2: Blood CP level in erysipelas patients depending on a disease period (mg/L)

Group	Period	n	X±m	P	P1
Healthy	-	25	403 ± 4.8	-	-
Erysipelas	I	34	318 ± 3.3	<0.001	-
	II	34	356 ± 3.5	<0.001	<0.001
	III	34	413 ± 2.6	>0.05	<0.001
	IV	18	406±5.6	>0.05	>0.05

The majority of examined patients had a maximum decreased index at the acute period (318±3.3 mg/L, P<0.001). At the blanching period, CP level increased (356±3.5 mg/L, P<0.001, P1<0.001), but returned to normal after early recovery (413±2.6 mg/L; P>0.05, P1<0.001).

Table 3: Blood MDA level in erysipelas patients depending on the presence/absence of a coexisting diabetes mellitus (μmol/L)

Group	Period	n	X±m	P	P2
Healthy	-	25	1.3 ± 0.08	-	-
Without coexisting diabetes mellitus	I	20	3.2 ± 0.11	<0.001	-
	II	20	2.6 ± 0.08	<0.001	-
	III	20	1.7 ± 0.09	>0.05	-
	IV	11	1.4±0.1	>0.05	-

Cont... **Table 3: Blood MDA level in erysipelas patients depending on the presence/absence of a coexisting diabetes mellitus (**μmol/L**)**

With coexisting diabetes mellitus	I	14	4.4±0.12	<0.001	<0.001
	II	14	3.2±0.09	<0.001	<0.001
	III	14	2.4±0.13	<0.001	<0.001
	IV	7	1.2±0.23	>0.05	>0.05

When patients were divided into 2 groups depending on the presence/absence of a coexisting diabetes mellitus, the following was found. There were significantly higher MDA values recorded in the group of patients with a burdened premorbid background in the form of diabetes mellitus at the acute period (4.4±0.12 μmol/L; P<0,001; P2<0,001), blanching period (3.2±0.09 μmol/L, P<0.001, P2<0.001) and at the period of early recovery (2.4±0.13 μmol/L, P<0.001, P2<0.001) versus the corresponding periods in the group of patients without diabetes mellitus. In this case, MDA level normalized only at the period of late recovery (1.2±0.23 μmol/L; P>0.05; P2<0.05) in contrast to the first group of patients (Table 3).

Table 4: Blood CP level in erysipelas patients depending on the presence/absence of a coexisting diabetes mellitus (μmol/L)

Group	Period	n	X±m	P	P2
Healthy	-	25	403±4.8	-	-
Without coexisting diabetes mellitus	I	20	332±4.2	<0.001	-
	II	20	359±6.1	<0.001	-
	III	20	394±5.4	>0.05	-
	IV	11	408±7.8	>0.05	-
With coexisting diabetes mellitus	I	14	305±5.6	<0.001	<0.001
	II	14	331±7.1	<0.001	<0.01
	III	14	373±5.6	<0.001	<0.01
	IV	7	401±9.8	>0.05	>0.05

RESULTS AND DISCUSSION

Thus, we have recorded an increase in serum MDA levels in erysipelas patients. MDA is, in fact, an intermediate LPO product that characterizes the degree of endogenous intoxication. In this case, MDA dynamics depended on the presence/absence of a coexisting diabetes mellitus[21].

CP level analysis depending on the presence/absence of a coexisting diabetes mellitus has showed that a decrease in CP was significantly more pronounced in the group of patients with a burdened premorbid background in the form of diabetes mellitus at the acute period, blanching period and at the period of early recovery the than in the first group (305±5.6 mg/L; P <0.001; P2<0.001; 331±7.1 mg/L; P<0.001; P2<0.001; 373±5.6 mg/L; P<0.001; P2<0.001) .

In the group of patients with coexisting diabetes mellitus, CP level has normalized only at the period of late recovery (401±9.8 mg/L; P>0.05; P2<0.05) (Table 4). This indicates a more pronounced imbalance in pro- and antioxidant systems in patients with diabetes mellitus, when a high level of LPO products is accompanied by a deficit of antioxidant protection, which obviously contributes to more pronounced pathological changes in the body.

CONCLUSION

As a result of the experiment, it turned out that lipid peroxidation occurs in biological membranes during the period of erysipelas. This is manifested by an increase in blood MDA level, as well as by a deficit of antioxidant protection and a decrease in the plasma antioxidant (ceruloplasmin). Recorded changes in considered

parameters were more pronounced and returned to normal after treatment on the unfavorable premorbid background – such a serious disease as diabetes mellitus.

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REFERENCES

1. Erovichenkov AA, Kulikov AG, Kuzovleva EV, Potekaeva SA, Mihajlenko OS. The microcirculation in patients with hemorrhagic forms of erysipelas. Infectious Diseases. 2014; 2: 63-66;
2. Erovichenkov AA, Kosheleva IV, et al. Erysipelas (clinic presentation, diagnosis, treatment): textbook. Russian Medical Academy of Postgraduate Education; 2017. 51 p.
3. Briko NI, Malyshev NA, Pokrovsky VI. Science-based strategy for streptococcal (group A) infections control. The VII Russian Congress of Infectious Disease Specialista. Nizhny Novgorod; 2006. 23-24 p.
4. Erovichenkov AA. Modern aspects of face therapy. Clinical pharmacology and therapy. 2005; 14 (2): 73-77.
5. Nagoev BS, Marjokhova AR. Time course of changes in some indicators of endogenous intoxication in erysipelas. Epidemiology and Infectious Diseases. Current Items. 2013; 3: 33-39.
6. Ratnikova JIM, Zhamburchinova AN, Lavrentieva NV. Clinic and epidemiological characteristics of erysipelas at the present stage. Infectious Diseases. 2006; 4: 74-77.
7. Khasanov AG, Shaybakov DG. Some of the contenttious issues of erysipelas. Modern problems of science and education. 2014; 1.
8. Bisno AL, Brito MO, Collins CM. Molecular basis of group A streptococcal virulence. Lancet. Infect. Dis. 2003; 3(4): 191-200.
9. Edwards J, Green P, Haase D. A Blistering disease: bullous erysipelas. CMAJ. 2006; 175(3): 244.
10. Gyrd-Hansen D. Willingness to pay for a QALY. Health Econ. 2003(12): 1049-1060.
11. Erovichenkov AA, Potekayeva SA, Anokhina GI, Maloletneva NV, Troitsky VI. Actual Aspects Of Modern Clinical Manifestations, Treatment And Rehabilitation Of Patients With Erysipelas. Pharmateca. 2012; 20: 62-67.
12. Ignatenko NN, Strygin OP. Features of erysipelas in patients with type 2 diabetes mellitus. Actual problems of modern science; 2006.
13. Marzhokhova MYu, Afashagova MM. Endogenous intoxication in erysipelas patients on the background of diabetes mellitus. Proceedings of the 8th Annual All-Russian Congress on Infectious Diseases. Moscow. 2016; 28-30: 173.
14. Ship SA. Features of nitrogen synthesis and the status of free-radical oxidation in erysipelas patients: dissertation of Candidate of Medicine. Moscow; 2012.
15. Parola M, Robino G. Oxidative stress-related molecules and liver fibrosis. J. Hepatol. 2001; 35: 297–306.
16. Ashirova AB. Disturbances in the microorganism community of basic biotopes in erysipelas patients, predicting its recurrent course: dissertation of Candidate of Medicine. Moscow; 2012.
17. Khasanov AG, Shaybakov DG. Modern methods for treating erysipelas. Bashkortostan Medical Journal. 2013; 8(5): 108-111.
18. Vasiliev VB, Kachurin AM, Soroka NV. Dismuting superoxide radicals with ceruloplasmin. Biochemistry. 1996; 61(2): 296-307;
19. Kseyko DA, Gening TP, Bochkova EG, Kotelnikov SV, Sadretdinova LN, Marakaeva TR. Antioxidant resisnance of erythrocytes after blood loss and conditions of correction of ascorbic acid. 2014; 12(11): 2357-2360.
20. Ushiama M, Michiara M. Biochem. 1978; 86(1): 271–278.
21. Kamyshnikov VS. Guide to clinical and biochemical laboratory diagnostics. Minsk. 2000; 1-2.

Environmental Health Risk Due to Exposure to Lead in Batteries Smelter Industry- Cinangka Village, Bogor, Indonesia

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ABSTRACT

Lead is one of the toxic chemicals causing dangerous air pollution in the environment and its very dangerous for human health whose toxicity lasts for a lifetime because lead accumulates in the human body. Black lead is one of the components of the battery that is needed as the basic material for making batteries. Used batteries can be recycled by melting the lead contained in the plates into black bars that can be reused as raw material for making new batteries. This research was aimed to assess the magnitude of emerging health risk of ambient air Pb exposure to residence at smelter batteries area. This study uses a design of public health risk analysis or also called *Public Health Assessment*. The subject of this study is the human population at risk of being exposed to Pb in this case the people living around the former battery smelter in Cinangka Village. The smallest Pb concentration recorded in the study is 0.00004 mg/m^3 which is outside the used battery smelting industry. While the largest Pb concentration recorded is 0.00091 mg/m^3 which is located in the used battery smelting industry area. The results of the RQ values in this study indicate that only 4% of respondent has an unaccepted non carcinogenic risk which required risk management action. Futher research on particle toxicology evaluation is recommended to be carried out in the future.

Keyword : *Lead, Inhalation, Public Health Assessment, Ambient Air*

INTRODUCTION

At present, the problem of poor environmental quality is causing increasingly complex health problems, including air pollution. Polluted air contains dangerous metals about 0.01-3% of all dust particulates in the air. However, the metal was accumulative and synergistic reactions occur in body tissues. The metal in the air that was inhaled has a greater effect than the same dose that comes from food [(1).]

Lead is one of the heavy metals that pollute the air and lead exposure continues to be a serious public health problem and the incident is difficult to know [(2)]. Black lead is one of the components of the battery that is needed as the basic material for making batteries. Batteries are one of the important components for power generation for motor vehicles. With the increasing demand for motorized vehicles in Indonesia, of course there is also an increase in the demand for batteries, where the battery needs are also determined by the life of the vehicle so that there will be accumulation of used batteries [(3)].

Based on a report on the Worst Pollution Issues in the World in 2016 hold by Pure Earth Blacksmith Institute said that recycling and smelting of used batteries became the top 3 polluting industries were included in the worst polluting industries in the world. This industry collectively places more than 32 million people at risk and reaches 7 million to 17 million Disability-Adjusted Life Years (DALYs) in low- and middle-income countries [(4)]. Communities living near the battery recycling industry are at risk of being exposed to lead, and contaminating the soil and surrounding plants [(5)]. A review of the published literature on the exposure of formal sector lead-acid battery manufacturing and recycling plants in developing countries found that elevated blood and lead concentrations in the air were common [(6)].

The entry of metal Pb compounds into the body through food, drinks, air and penetration of membranes or layers of skin. Some Pb inhaled will enter the pulmonary blood vessels. The absorption rate is strongly influenced by the particle size of the existing Pb metal

compounds and the volume of air that can be inhaled during breathing. Pb metal that enters the lungs will be absorbed and bound to the blood in the lungs and then circulated to all tissues and organs of the body. More than 90% of Pb metal is absorbed by blood binding to red blood cells [7].

In Indonesia, in 2014 cases of lead poisoning occurred in Cinangka Village, Ciampea District, Bogor Regency. Based on the report of Komisi Pemberantasan Bensin Bertimbal (KPBB) that pollution in Cinangka Village comes from smelting of used batteries, with lead levels in the ground reaching 270,000 ppm (part per million), this indicates that lead levels have exceeded the threshold values set by WHO that is 400 ppm. In addition, blood lead levels in the local population reached an average of 36.62 mcg / dL, with the highest level of 65 mcg / dL. This shows that the blood lead level of the local population has exceeded the WHO threshold value of 10 mcg / dL [8].

Research conducted by Rizqiana Halim in 2016 about the effect of lead in the blood of pregnant women on infant birth weight in Cinangka Village showed that mothers who were exposed to lead had maximum blood lead levels of 17.2 µg / dl this had exceeded the value the normal threshold set by WHO, which is 10 µg / dl [9].

Black lead (Pb) in the air can cause adverse effects on human health, including disrupting the biosynthesis of hemoglobin and causing anemia, causing an increase in blood pressure, kidney damage, nervous system disorders that damage the brain and reduce IQ and concentration and reduce men. fertility through sperm destruction [10].

METHOD

The design of this study was the Environmental Health Risk Assessment (EHRA) which consists of several steps, that are hazard identification, dose-response analysis, exposure assessment, and risk characterization [12]. Environmental data taken include air ambient. The sample of this study was 101 residents of Cinangka Village obtained through sample size formula and selected by proposive sampling. The study was conducted from July to Agust 2018.

The calculation of lead intake is obtained from the calculation of Intake (I), through the following equa

$$I = \frac{C \times R \times t_e \times f_e \times Dt}{Wb \times t_{vag}}$$

Explanation:

I = Intake, mg/kg/day

C = Consentration of risk agent (mg/m^3)

R = Rate of intake or consumption (m^3/hours)

t_e = Exposure time per day (hours /day) for inhalation

f_e = frequency of annual exposure (day/year).

D_t = Duration of exposure, year (real time or projection, 30 years for residential defaulth value

Wb = Weight (Kg)

t_{avg} = Average time period, 30 years x 365 days / year

(non-carcinogenic) or 70 years x 365 days / year (carcinogenic)

Estimation of the level of health risks derived from calculation using Risk Quotient (RQ) is calculated throught the equation [12]:

$$Risk\ Quotient\ (RQ) = \frac{Intake}{RfC}$$

The interpretation of the RQ value obtained from the formula calculation is if RQ>1 means having a helath risk. RfC (Inhalation Reference Concentration) is the amount of chemicals that can be inhaled in a lifetime is not anticipated to non-cancer health effects.

RESULT

General Characteristic of Respondent

Distribution of respondents based on gender, education and type of work in the Cinangka Village, Bogor Regency in 2018 can be seen in table 1.

Table 1. Frequency Distribution of Social, Economic and Demographic Characteristics Of Cinangka Village Residents, Bogor District 2018

Variabel	Total	Percentage
Sex		
Male	19	18.8
Female	82	81,2
Education		
No school	15	14.9
Finished Elementary School	66	65.3
Finished Junior High School	13	12.9
Finished Senior High School	7	6.9
Occupotional		
Smelter	13	12.9
Not Smelter	88	87.1
Total	101	100.0

Based on table 1, the frequency distribution of social, economic and demographic characteristic of Cinangka village residents, most of respondents are woman, namely 80.4%. Most of respondents graduated from elementary schoool (64.7%). Most of the respondents are not smelter that is equal to 87.1%.

Table 2. Characteristic of Anthropometry of Cinangka Village Residents, Bogor District 2018

Variable	Mean ± SD	Median	Range	Distribution***
Antropometry				
Weight (Kg)	54.34±10.69	53.00	37-83	Normal
Height (Cm)	152.26±7.26	151.00	138-175	Normal
Body Mass Indeks (BMI)	23.48±3.93	23.06	15.90-34.55	Normal
Intake Rate (R, mg^3/hour)	0.59±0.04	0.59	0.51-0.69	Normal

Based on the table 2, the average age of respondents is 40.16 years old with a range of 16 to 75 years old. Average weight of respondents is 54.34 kg with a range of 37 kg to 83 kg. For height, the averange height of responden is 152.26 cm with range of 138 cm to 175 cm. For body mass index, the average respondent was 23.48 with a range of 15.90 to 34.55.

Concentration of Pb in The Air

Pb concentration test is carried out in 10 points around the smelting industry of used batteries.

Table 3: Concentration of Pb in The Air, Cinangka Village Residents, Bogor District 2018

Location	Pb of Ambient air (µg/Nm^3)	Pb of Ambient Air (mg/m^3)	Temperatur e (°C)	Relative Humidity (%)
Point 1	0.28 µg/Nm3	0.00028	33ºC	56%
Point 2	0.24 µg/Nm3	0.00024	33ºC	55%
Point 3	0.096 µg/Nm3	0.00009	33ºC	54%
Point 4	0.21 µg/Nm3	0,00021	33ºC	56%
Point 5	0.42 µg/Nm3	0,00042	33ºC	56%
Point 6	0.91 µg/Nm3	0,00091	33ºC	58%
Point 7	0.86 µg/Nm3	0,00086	33ºC	51%
Point 8	0.39 µg/Nm3	0,00039	33ºC	50%
Point 9	0.069 µg/Nm3	0,00006	33ºC	52%
Point 10	0.04 µg/Nm3	0,00004	33ºC	52%

Description: Threshold value 2,0 mg/m^3

Pb concentration in the study site with the number of measuring points in a total of 10 samples scattered in each location near the smelter of used batteries. The smallest Pb concentration recorded was 0.00004 mg/m^3 which outside the used battery smelting industry. While the largest Pb concentration recorded was 0.00091 mg/m^3 which located in the used battery smelting industry. The temperature specified at all points is 33ºC. The highest and lowest humidity recorded at the research site, respectively 58% and 50%.

Exposure Analysis and Intake Calculation

In this study, the exposure assessment concept used to measure the amount of exposure to analyze the amount of exposure, namely by calculating the amount of intake (intake) of lead that enters the body. Calculation of intake amount was obtained by calculation based on intake rate (m^3/hour), exposure time (hours/day), annual exposure frequency (day/year), duration of exposure (real time) in years, weight (kg), average time period (30 years x 365 days / year for non-carcinogens and 70 years x 365 days / year for carcinogens).

Calculation of lead intake in 101 respondents used a computer with Microsoft-Excel program. Calculation of intake of lead concentrations in the surrounding environment is obtained using equations [12].

$$I = \frac{C \times R \times t_e \times f_e \times Dt}{Wb \times t_{vag}}$$

The example of intake calculation used one of the following sample data of respondents and default data (US EPA) if known:

C : Consentration Pb = 0.00028 mg/m^3

R : Intake Rate (m^3/hour)

Normal Intake Rate (EPA, 1997 in Ambrianto, 2004): y = 5,3 In (x) – 6,9

Y= (5,3) (In(56))-6,9 = 14,43 m^3/day = 14,43/24 = 0,6014 m^3/hour

te : 24 hour/day

fe : 350 (day/year) day

Dt : Real Exposure Duration *(*year) = 48 Years

Wb : Body Weight = 56 kg

t_{avg} : Average Periode (non carsinogenic = 30 years x 365 day/year = 10950 day/year).

The calculation of non carcinogen intake was:

$$I = \frac{(0{,}00028\ mg/m^3)(0{,}6014\ m^3/hour)(24\ hour/day)(350\ day)(48\ year)}{(56\ Kg)(10950\ day/year)}$$

= 0,00011 (mg/kg)/day

The results of the calculation of intake for non-carcinogens obtained intake was 0.00011 (mg/kg)/ day. Using the same formula as the example above, the calculation of non-carcinogenic Intakes in 101 respondents (research sample) was calculated with the Microsoft-Excel program.

Table 4 Intake non-carcinogens

Variabels	n	Minimum	Maximum	Median	Std.Dev.
Intake Non-carcinogens	101	0.000001	0.00071	9.0E-5	1.19E-4

The results of the study showed that intake of lead exposure at 101 respondents in Cinangka Village as shown in table 4 obtained the lowest intake value of non-carcinogen 0.00001 (mg/kg)/day and maximum of 0.00071 (mg / kg) / day with a middle value 9.0E-5 (mg / kg) / day.

Risk Characteristics (Risk Characterization)

Calculation of estimated risk level with non-carcinogenic risk calculation equation (RQ) [11] :

$$\text{Risk Quotients (RQ)} = \frac{Intake}{RfC}$$

The concentration value (RfC) for real time RQ is 0.0004 mg / kg / day (IRIS, 2006). The example of non-carcinogen calculation (RQ) using the intake data of one of the sample workers' data is as follows:

$$\text{Risk Quotients (RQ)}_{\text{real time}} = \frac{0{,}00011\ mg/kg/day}{0{,}0004\ mg/kg/day}$$

= 0,277

Table 5 Result of risk assesment of non-carcinogenic risk on community in Cinangka Village Residents

Risk	Frequency	Percentage
Risk of Non-carcinogen (*real time)*		
RQ>1	4	4%
RQ≤1	97	96%
Total	101	100%

Based on table 5, 4% of respondent has an unaccepted non carcinogenic risk which required risk management action.

DISCUSSION

Non-regulated, informal recycling practices occur in many countries and have resulted in lead exposure and poisoning, with young children being particularly at risk. This practice was carried out in areas with high

population density, which means that this recycling operation has the potential to affect a number of people. A study conducted in Dakar, Senegal about mass lead poisoning which showed that lead poisoning resulted from informal used lead-acid batteries. Stockpiles contained in car batteries are of particular concern because they contribute as much as 80% of lead consumption worldwide and produce lead waste in almost every country [14].

Based on the measurement results found in Table 3, the largest recorded Pb concentration is 0.00091 mg/m^3 which is located in the used battery smelter industry compared to Threshold Value (NAV) in the Government Regulation of the Republic of Indonesia Number 41 of 1999 concerning Quality Raw Air Pollution Control The environment for lead (Pb) in the air was 2.0 mg/m^3, the concentration of lead (Pb) around the former smelter environment of Cinangka Village, Bogor Regency was still below the Threshold Limit Value set for exposure during 24 hours per day.

A study of the level of risk of ambient air lead exposure, said that statistically the wind speed has a significant relationship to lead concentration. Increased wind speed also increases the concentration of lead in the air. When the speed of air becomes calm the air temperature in the upper atmosphere becomes higher than the temperature below it [13].

Various stages in the recycling process can result in the release of lead smoke and particles in the air. A study has shown that high lead exposure is located at the location of lead-acid battery recycling [7]. Air lead concentration has been shown to correlate with blood lead concentration in workers. Lead in the air eventually settles and contaminates the surrounding surface.

The results of the RQ values indicate that 4 (4%) of the respondents have a risk of air lead concentration in Cinangka Village. The RQ value in the table shows that lead exposure is not harmful to public health. This indicates that the concentration does not cause non-carcinogenic effects. From the observation of questionnaires were 54.5% who experienced respiratory complaints. The main lead exposure path was most likely through inhalation of Lead dust that enters the body through the inhalation path in the form of particulates, tightly causing the respiratory tract to disrupt.

CONCLUSION

The frequency distribution of the social, economic and demographic characteristics of the villagers of Cinangka, most of the respondents were women, namely 81.2%. Most of respondents graduated from elementary school (65.3%). The average weight, height, and body mass index was 54.34 kg, 152.26 cm, and 23.48, respectively. Most of the respondents (87.1%) are not work in smelting industry. The highest Pb concentration recorded was 0.00091 mg/m^3 which located in the used battery smelting industry. The results of the RQ values indicate that only 4% of respondent has an unaccepted non carcinogenic risk which required risk management action. Futher research on particle toxicology evaluation is recommended to be carried out in the future.

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Conflict of Interest

Authors declare no conflict of interest in this study.

Ethical Clearance: The ethical clearance of this research taken from Ethics Committee of Faculty of Public Health, Universitas Indonesia,

REFERENCES

1. Suhendro, Soedibyo HP, Purnomo W. Lead Content in Blood and Health Impacts on Drivers of AC and Non AC City Buses in Surabaya City. Environmental Health Journal. 2007.
2. Mitchell RN, Kumar, Abas & Fausto. Pathological basis of disease. Jakarta : Penerbit Buku Kedokteran EGC. 2006.
3. Fardiaz S. Water and Air Pollution. Yogyakarta: Kanisius. 1992.
4. Suksmerri S. The Implact of Black Metal (Pb) Pollution to Human Health. Public Health Journal. 2008; II(2).
5. Palar H. Heavy Metal Pollution and Toxicology. Jakarta: Rineka Cipta. 2004.
6. Bernhardt A. The Toxics Beneath Our Feet. Blacksmith Institute. 2016.
7. Gottesfeld P, Pokhrel AK. Review: Lead Exposure

In Battery Manufacturing And Recycling In Developing Countries And Among Children In Nearby Communities. Journal of Occupational and Environmental Hygiene. 2011.

8. Committee on the Elimination of Leaded Gasoline (CELG). Ecological Genocide: Impact of Air Pollution from Smelting of Used Batteries. www.kpbb.org. 2013.
9. Halim R. Effect of Lead in the Blood of Pregnant Women on the Birth Weight of Babies in Cinangka Village, Ciampea District, Bogor Regency in 2016: Prospective Cohort Study. Thesis. 2016.
10. Irianto K. Prevention and Management of Hazardous Chemicals Poisoning. CV. Yrama Widya. Bandung. 2013.
11. Louvar dan Louvar B. D. Health and Environmental Risk Analysis: Fundamentals with Applications By Joseph Louvar and B. Diane Louvar Prentice Hall. 1998.
12. Rahman A. Teaching Materials Training (Basic Intensive Program) Center for Environmental & Industrial Health Studies, Faculty of Public Health, University of Indonesia Depok. Depok: Center for Environmental Health Studies and the Public Health Industry Universitas Indonesia. 2007.
13. Ria E. Exposure Risk Levels of Airborne Leaders Against Health Problems of Primary School Students According to Temporal Variations in Muncul Sub-District, Setu District, South Tangerang City. Thesis. Universitas Indonesia. 2015.
14. Haefliger P, Mathieu-Nolf M, Lociciro S, Ndiaye C, Coly M, Diouf A, Faye AL, Sow A, Tempowski J, Pronczuk J, Filipe Junior AP, Bertollini R, Neira M. Mass lead intoxication from informal used lead-acid battery recycling in Dakar, Senegal. Environmental Health Perspectives. 2009; 117. 2009

Evaluation of Bone Mineral Density in Adult Epileptic Patients Treated With Valproate

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ABSTRACT

Background: There is increasing evidence that chronic treatment with antiepileptic drugs is associated with changes in bone metabolism, increasing the risk of fractures in patients with epilepsy. A few studies have investigated the effect of valproic acid on the bone metabolism and bone mineral density, and there are conflicting results regarding the effect of valproate on the bone mineral density with the majority of studies suggesting that valproic acid reduces bone density.

Objective: To evaluate the effect of long-term Valproate monotherapy on bone mineral density and bone biomarkers.

Methods: A case-control study was conducted in forty epileptic patients (22 females and 18 males) on a long-term valproic acid therapy. The control group included forty (22 females and 18) apparently healthy volunteers.

Bone mineral density was measured by dual energy x-ray absorptiometry scan at the lumbar spine (L1-4) and blood samples were obtained for all subjects, and analyzed for total serum calcium, phosphate, vitamin D level and parathyroid hormone.

Results: We found a decrease in the bone mineral density T score (osteopenia and osteoporosis) of epileptic group is about 22.5% compared with its percentage in the control group which is 7% only.

We found significantly lower vitamin D level in epileptic group compared with control group (52.5% for epileptic group versus 30% for the control group; including both deficiency and insufficiency).

Conclusions: Bone mineral density Z- and T-score of the lumber spine in adult epileptic on long-term valproic acid therapy was decreased as compared with age- and sex-matched controls; this result was inversely correlated with the dose and duration of valproic acid therapy.

Keywords: *Epilepsy, valproic acid vitamin D, bone mineral density, osteoporosis.*

INTRODUCTION

A standard definition of epilepsy is as a disorder of brain characterized by an ongoing liability to recurrent epileptic seizures. An epileptic seizure is defined as the transient clinical manifestations that result from an episode of abnormal neuronal activity [1].

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The increased risk of bone disease in patients with epilepsy manifests as a 1.3 to 3.8 relative risk of osteopenia, a 1.7 to 3.8 relative risk of osteoporosis, and a 1.7 to 6.1 relative risk of fractures[2].

Risk factors specific to epilepsy or its treatment have been identified. These include [3]: 1. Fall-related fractures. Patients with epilepsy are at risk for seizure-related falls in addition to falls caused by ataxia, sedation, and gait instability due to either the neurologic pathology underlying the epilepsy or the side effects of Anti-epileptic drugs (AEDs) used to treat seizures.

2. Direct effects of AED treatment on bone health.

Calcium and its ionized fraction are regulated by parathyroid hormone (PTH)[4]. Osteoporosis is characterized by reduced bone strength usually accompanied by a reduction in bone mass [5].

Secondary osteoporosis occurs in association with medical illnesses or medications that results in bone loss[6].

The major biologically active metabolite, 1,25-dihydroxyvitamin D, plays a central part in maintaining calcium and phosphate homoeostasis , Vitamin D is essential for skeletal health, and severe deficiency is associated with defective mineralization resulting in rickets or its adult equivalent, osteomalacia[7]. Bone Mineral Density is the amount of bone mineral in bone tissue [8]. Dual-energy X-ray absorptiometry is considered as gold standard for assessing bone density measurement [9]. Results are generally scored by two measures, the T-score and the Z-score, negative scores indicate lower bone density, and positive scores indicate higher [10].

Hepatic enzyme inducers, such as phenytoin, carbamazepine, phenobarbital, and primidone, and non-inducing AEDs such as valproate, are known to be associated with accelerated rate of bone loss and development of secondary osteopenia and osteoporosis with an increase in the risk for fractures [11].

Cytochrome P450 enzyme inducing AEDs are most commonly associated with a negative impact on bone [12].

Although VPA is a cytochrome P450 enzyme inhibitor ; studies do suggest an effect on bone [13],but negative effects have been reported in other studies[14].

VPA has displayed a direct effect on bone cultured bone cells, resulting in increased bone turnover with osteoblastic (bone formation) and osteoclastic (bone resorption) [14].

Serum concentrations of calcium and bone Gla protein (bone formation marker) and pyridinoline cross-linked carboxy-terminal telopeptide of type-I collagen (ICTP – bone resorption marker) were significantly higher with VPA long term therapy [15].

It is possible that the inhibition of bioactivation of vitamin D_3 by VPA causes rickets and osteomalacia, and the site of inhibition is expected to be the cytochrome *P*-450 mediated reactions in liver mitochondria [16].

AIMS OF THE STUDY

The aim of this study was to evaluate the effect of long-term VPA monotherapy on BMD by DXA measurements and bone biochemical indices in adult epileptic patients.

To clarify the relationship between BMD with dose and duration of VPA monotherapy therapy.

PATIENTS AND METHODS

Subjects:

A case-control study was conducted on 40 patients (22 females and 18 males) at epilepsy clinic of Baghdad teaching hospital, medical city, collected during the period from feberuary-2017 to feberuary-2018.

Subjects for comparison were 40 healthy and active volunteers (22 females and 18 males) collected in the same period at Baghdad teaching hospital. All study subjects were well matched with respect to age, sex, and BMI.

The inclusion criteria:

1- Active epileptic patients aged between 18-45 years.

2- Patients treated with VPA as monotherapy for first time.

3- The duration of therapy should be more than 6 months.

4-Patients body mass index (BMI) range from (18.5 to 30).

The exclusion criteria:

1- Subjects with known chronic medical illnesses (hypertension, diabetes mellitus, and renal, thyroid and parathyroid diseases) or neurological disease other than epilepsy.

2- Subjects with history of pathological bone fractures.

3- Subjects with vitamins supplement,

glucocorticoid, anabolic steroid, calcitonin and other drugs known to effect bone metabolism.

4-History of cigarette smoking or heavy alcohol use.

5- Pregnant women, women with amenorrhea and hysterectomy.

6. Extreme activity life style (Extremely inactive, extremely active).

7- Subjects with diet restriction.

Method

Forty registered epileptic patients in the epilepsy clinic of Baghdad teaching hospital were selected.

Forty control healthy people were selected in an appropriate manner to balance gender, age, physical activity level and BMI differences with epileptic group. Volunteers chosen to participate in this study after clarifying the study objectives and radiation risk. The same exclusion criteria as the epileptic group were applied to control group.

A questionnaire was administered to all subjects and including the following:

1. Demographic information's: about gender, age, and the physical activity.

We assess the physical activity according to (WHO scale)[17] .

2. Epilepsy characters: type of epilepsy (according to *ILAE* classification), duration of epilepsy and control status [18].

3. Pharmacological information's about type, dose and duration of VPA therapy.

4. Biochemical bone markers: including serum calcium, phosphate, PTH and 25-OHD level.

5.Body mass indices measurements of all subject.

6. Results of DXA scan (lumber spine, T score and Z score).

All subjects had BMD measured by the same validated densitometer (stratos ver.v3.0.8.3 13/01/2014) to eliminate measurement error.

On the same day as bone density evaluation, blood samples were obtained from all subjects, and analyzed for total serum calcium, serum phosphate, parathyroid hormone and serum vitamin D level (Serum 25-OHD).

Statistical analysis:

The SPSS (Statistical Package for the Social Science) program, version 23, was used for all computerized statistical analyses.

RESULTS

Baseline demographic and clinical characteristic of study subjects were shown on Table1.

Although not presumed as inclusion criteria, all patients enrolled in this study had been diagnosed with idiopathic generalized epilepsy; 31 patients (77.5%) had generalized tonic-clonic epilepsy, 5 patients (12.5%) had juvenile myoclonic epilepsy and 4 patients (10%) had myoclonic-tonic-clonic epilepsy. The mean dose of VPA therapy (742.5 ± 390.2 Mg/day). The mean duration of VPA therapy was (4.9 ± 3.2) years.

The mean serum calcium was (9.1 ± 0.9) and (8.9 ± 0.8) for both epileptic and control group respectively; both values were within normal range and there was no significant statistical difference (*p* value was 0.4568). Table 2.

The mean serum phosphate was (3.7 ± 1.1) and (3.5 ± 0.6) for epileptic and control group respectively; both values were within normal range and there was no significant statistical difference (*p* value was *0.3379*).

The mean vitamin D levels for epileptic group was in the insufficient range (26.6 ± 12.3); 47.5% had normal vitamin D levels, 52.5% had low vitamin D level; (37.5% of them had vitamin D insufficiency and 15% had vitamin D deficiency), While the mean vitamin D level for control group was in the normal range (32.9 ± 10); 70% had normal vitamin D level, 25% had vitamin D insufficiency level and 5% had vitamin D deficiency. Note that, There was significant statistical difference (*p* value was 0.0135).

The mean PTH for epileptic group was (56.4 ± 38.4) which was in the upper limit of normal range and significantly (*p= 0.0015*) higher than that of control group which was (35.1 ± 13.5).

For epileptic group (75% had normal serum PTH level, 22.5% had hyperparathyroidism and 2.5% had

hypoparathyroidism.

For control group (97.5% had normal serum PTH level and 2.5% had hypoparathyroidism).

Result of BMD:

There was statistically significant difference between mean BMD Z score of the lumber spine (L1-4) for epileptic and control group. The mean lumber BMD Z score of epileptic group was significantly lower than that of control group. In addition, the mean BMD T score show statistically significant difference between the two groups; Table 3 elucidate the results.

Among epileptic group there was 31 patient (77.5%) had BMD T-score above -1 SD (normal), 8 patients (20%) had BMD T-score between -1 and -2 SD (osteopenic), 1 patient (2.5%) had BMD T-score of -2.7 SD (osteoporotic).

Among control group there was 37 patients (92.5%) had BMD T-score above -1 SD (normal) and 3 patients (7.5%) had BMD T-score between -1 and -2 SD (osteopenic) ,(according to T-score BMD of lumber spine – WHO definition).

The correlation between BMD Z-score with the dose, duration, vitamin D level and PTH was shown in the table 4; The correlation coefficient (*regression analysis r value)* was used to assess the strength and direction of a linear relationship between two variables on a scatter plot, figures 1 ,2.

Table 1: baseline characters of study subjects

`		**epileptic (n=40)**		**Control (n=40)**		***P value***
Age		30.1 ± 8.2		29.1 ± 7.2		*0.6180*
Sex		No.	percentage	No.	percentage	1.00
	Males	18	45%	18	45%	
	Females	22	55%	22	55%	
Physical activity level	sedentary	12	30%	5	12.5%	0.178
	Moderate	23	57.5%	25	62.5%	
	Vigorous	7	17.5%	10	25%	
Body mass index (kg/m2)		26.8 ± 3.5		25.1 ± 1.7		0.8475
Type of epilepsy	Generalized	40	100%	----		
	Focal	0	0%	----		
Control status	controlled	27	67.5%	----		
	uncontrolled	13	32.5%	----		
Duration of epilepsy		6.1 ± 2.4		----		
Dose of VPA (mg/day)		742.5 ± 390.2		----		
Duration of VPA therapy (yr)		4.9 ± 3.2		----		

Table 2 biochemical indices for study subjects			
Variable	**Epileptic (mean ± SD)**	**Controls (mean ± SD)**	***P value***
Serum calcium (mg/dl)	9.1 ± 0.9	8.9 ± 0.8	*0.4568*
Serum Phosphate (mg/dl)	3.7 ± 1.1	3.5 ± 0.6	*0.3379*
Vitamin D level (ng/ml)	26.5 ± 12.3	32.9 ± 10	***0.0135***
Parathyroid hormone (pg/ ml)	56.4 ± 38.4	35.1 ± 13.5	***0.0015***

Table 3 Bone mineral density of the lumber spine.			
Lumbar spine BMD (L1-4)	**Epileptic (Mean ± SD)**	**Controls (Mean ± SD)**	**P values**
BMD Z-score	-0.39 ± 1.1	0.1 ± 0.98	***0.0312***
BMD T-score	-0.33 ± 1.15	0.15 ± 0.976	***0.0434***

Table 4 Distribution of factors that related to BMD Z-score		
Variable	**r values**	**p values**
Dose (mg/ day)	**-0.4**	0.002
Duration of VPA therapy	**-0.6**	0.0001
Vitamin D level (ng/ml)	**+0.4**	0.002
PTH (pg/ml)	**-0.4**	0.002

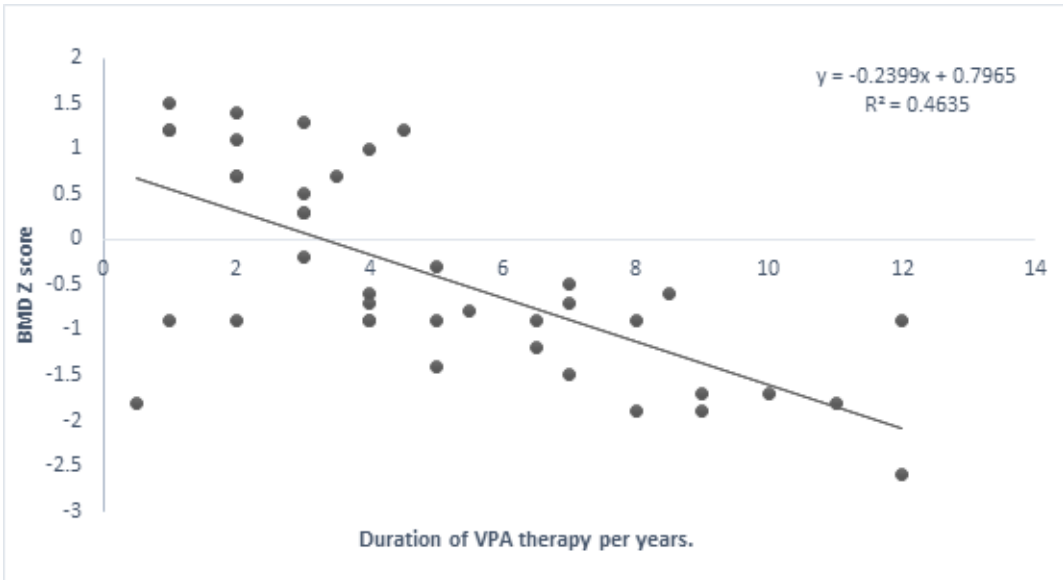

Figure 1: Show significant moderate to strong inverse (negative) correlation between BMD Z-score with the Duration of VPA therapy per year. (r = -0.6 and p = 0.0001).

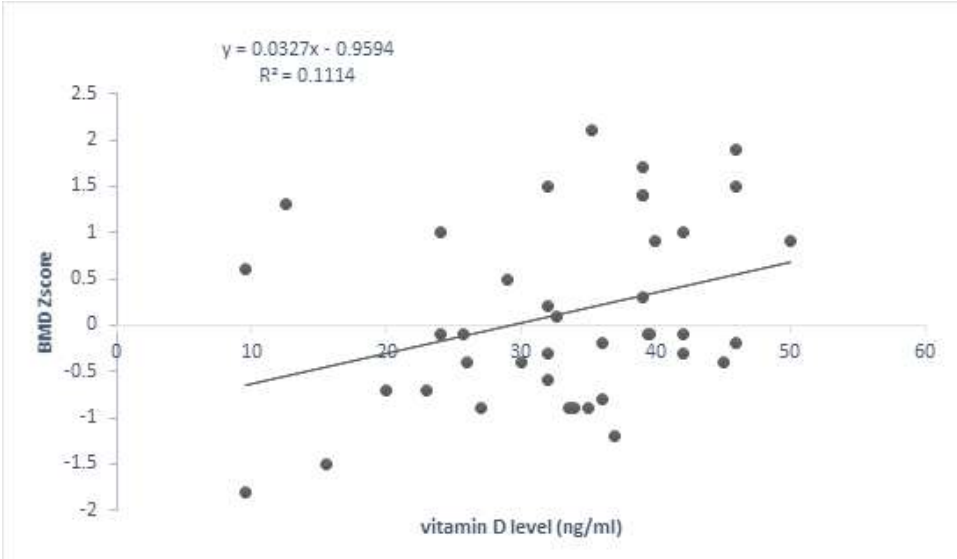

Figure 2: Show significant weak to moderate direct (positive) correlation between BMD Z-score and vitamin D level. (r = +0.4 and p = 0.002).

DISCUSSION

We found that the mean serum calcium and phosphate, for epileptic and control groups were within normal range, and there are no significant statistical differences between two groups, table 2. This result was consisted with some previous studies [19].

In the present study, we found significantly lower vitamin D level in epileptic group compared with control group (52.5% for epileptic group versus 30% for the control group; including both deficiency and insufficiency). Both groups were from the same geographical area, so the effect of sunshine exposure is unlikely to have played an important role; this result was consisted with the results of studies conducted by Shellhaas et al. [20] and Sato et al[13].

As observed in present study, the mean PTH for epileptic group was within the upper limit of normal range and it was significantly higher than control group; there were nine cases (22.5%) of secondary hyperparathyroidism noted in the epileptic group while no case was noted in control group, this mean that the BMD was decreased with increasing serum PTH level, and this result is consisted with the result of study conducted by Boluk et al [21].

Secondary hyperparathyroidism in the present study may be explained by decrease level of biologically active vitamin D that leads to decreased absorption of calcium in the gut, resulting in hypocalcaemia and an increase in circulating PTH [22]. PTH then increases the mobilization of bone calcium stores and subsequent bone turnover. However, the mean serum calcium in the present study was within normal range and did not correlate with the deficiency of vitamin D; this may be explained by long duration of secondary hyperparathyroidism that lead to correction of serum calcium on expense of bone demineralization [22].

We found a decrease in the BMD T score (osteopenia and osteoporosis) of epileptic group is about 22.5% compared with its percentage in the control group which is 7% only.

The observation of low BMD in adult epileptic patients in our study was consistent with some previous studies [21].

CONCLUSIONS

Long-term VPA therapy results in reduction of bone mineral density in adult's epileptic patients.

Low bone mineral density correlated inversely with the dose and duration of VPA therapy.

Low bone mineral density correlated directly with vitamin D level and inversely with parathyroid hormone in the epileptic patients with long-term VPA therapy.

Ethical Clearance-taken from Iraqi Board for Medical Specialization /Ministry of Higher Education And Scientific Research /Republic of Iraq**.**

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REFERRENCES

1. Simon Shorvon, Beate Diehl, John Duncan, Matthias Koepp, Fergus Rugg-Gunn, Josemir Sander, Matthew Walker and Tim Wehner.epilepsy and related disorder. Charles Clarke Robin Howard Martin Rossor Simon Shorvon (ed.).A Queen Square Textbook, Second Edition., Ltd. UCL Institute of Neurology , National Hospital for Neurology & Neurosurgery : John Wiley & Sons;2016.P.221.
2. Beerhorst K, van der Kruijs SJ, Verschuure P, Tan IF, Aldenkamp AP. Bone disease during chronic antiepileptic drug therapy: general versus specific risk factors. Journal of the neurological sciences. 2013 15;331(1):19-25.
3. Carlson C, Anderson CT. Special Issues in Epilepsy: The Elderly, the Immunocompromised, and Bone Health. Contnuum: Lifelong Learning in Neurology. 2016;22(1):246-61.
4. Brodie MJ, Mintzer S, Pack AM, Gidal BE, Vecht CJ, Schmidt D. Enzyme induction with antiepileptic drugs: cause for concern?. Epilepsia. 2013 ;54(1):11-27.
5. Lane NE. Metabolic bone disease. Current Opinion in Rheumatology. 2007 ;19(4):363.
6. Mirza F, Canalis E. Management of endocrine disease: secondary osteoporosis: pathophysiology and management. European journal of endocrinology. 2015 ;173(3):131-51
7. Holick MF. Sunlight and vitamin D for bone health and prevention of autoimmune diseases, cancers, and cardiovascular disease. The American journal of clinical nutrition. 2004 ;80(6):1678-88.
8. Stewart AD, Hannan J. Total and regional bone density in male runners, cyclists, and controls. Medicine and science in sports and exercise. 2000;32(8):1373-7.
9. Zaal A. Benchmarking the Quality of Medical Care of Childhood-Onset SLE .Doctoral dissertation. University of Cincinnati;2015.
10. Lane NE. Epidemiology, etiology, and diagnosis of osteoporosis. American journal of obstetrics and gynecology. ;194(2):S3-11.
11. Pack A. Bone health in people with epilepsy: is it impaired and what are the risk factors? Seizure. 2008;17:181–186.
12. Pack AM, Morrell MJ. Epilepsy and bone health in adults. Epilepsy & Behavior. 2004;5:24-9.
13. Sato Y, Kondo I, Ishida S, Motooka H, Takayama K, Tomita Y, Maeda H, Satoh K. Decreased bone mass and increased bone turnover with valproate therapy in adults with epilepsy. Neurology. 2001;57(3):445-9.
14. Pack AM, Morrell MJ, Randall A, McMahon DJ, Shane E. Bone health in young women with epilepsy after one year of antiepileptic drug monotherapy. Neurology. 2008 ;70(18):1586-93.
15. S valheim S, Røste LS, Nakken KO, Taubøll E. Bone health in adults with epilepsy. Acta Neurologica Scandinavica. 2011;124(s191):89-95.
16. Ecevit Ç, Aydoğan A, ülay Kavakli T, Altinöz S. Effect of carbamazepine and valproate on bone mineral density. Pediatric neurology. 2004;31(4):279-82.
17. World Health Organization, United Nations University. Protein and amino acid requirements in human nutrition.2007. http://apps.who.int/iris/handle/10665/43411(accessed :sep 2107) .
18. Kwan P, Arzimanoglou A, Berg AT, Brodie MJ, Allen Hauser W, Mathern G, Moshé SL, Perucca E, Wiebe S, French J. Definition of drug resistant epilepsy: consensus proposal by the ad hoc Task Force of the ILAE Commission on Therapeutic Strategies. Epilepsia. 2010;51(6):1069-77.
19. Andress DL, Ozuna J, Tirschwell D, Grande L, Johnson M, Jacobson AF, et al. Antiepileptic drug-induced bone loss in young male patients who have seizures. Arch Neurol 2002;59:781—6.
20. Shellhaas RA, Barks AK, Joshi SM. Prevalence and risk factors for vitamin D insufficiency among children with epilepsy. Pediatric neurology. 2010;42(6):422-6.
21. Boluk A, Guzelipek M, Savlı H, Temel I, Ozışık HI, Kaygusuz A. The effect of valproate on bone mineral density in adult epileptic patients. Pharmacological research. 2004;50(1):93-7.
22. Meier C,Kraenzlin ME.Antiepileptics and bone health.theraputic advances in muscloskeletal disease.2011;3(5):235-43.

Correlation between Micronutrient intake and Hemoglobin Preconception Women

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ABSTRACT

The preconception period is the time to prepare for pregnancy, and it is prone to anemia. While iron deficiency is considered the main cause of nutritional anemia, changes in vitamin B6, vitamin B12, folic acid and zinc status are also associated with the formation and hemoglobin levels. This study aims to determine the relationship between intake of iron, vitamin B6, vitamin B12, folic acid and zinc with hemoglobin levels in preconception women in Banggai Regency from October 2016 to April 2017. This study was cross-sectional study design. Using data from a 24-hour food recall assessment, measuring the daily intake for each respondent of 132 preconception women in three sub-districts in Banggai Regency. Micronutrient intake was obtained by comparing nutritional intake with the table of the Nutrient Adequacy Rate (NAR) 2013. Hemoglobin levels were measured by the *cyanmethaemoglobin* method. The result of this study, the proportion of RDA is below-estimated average needs. As a result, the average hemoglobin level was 12.67 ± 1.24 g/dl. There were 20% anemia, from anemia respondents suffering from mild anemia (16%) and moderate anemia (4%). With the Pearson correlation test, there was no significant relationship between iron (r=0.056), vitamin B6 (r=0,06), vitamin B12 (r=0.085), folic acid (r=0.062) and zinc intake with hemoglobin levels. In conclusion, the most preconception women are still at risk of lacking micronutrients such as iron, zinc, folate, vitamin B12, and vitamin B6. Prenatal counseling about the importance of nutrition for the health of pregnant women and their babies are needed.

***Keywords**: preconception women, micronutrient intake*

INTRODUCTION

Globally, around 32 million pregnant women and 273 million children under five suffer from anemia in Southeast Asia, the burden of anemia is very high and more than 1 in 4 women suffer from anemia during pregnancy. The causes of anemia vary, but iron deficiency has been identified as the most common and has been associated with an increased risk of maternal and perinatal death and poor birth outcomes[1].

Banggai Regency in Central Sulawesi Province, Indonesia has a high prevalence of anemia of 36.6% in women[2] compared to the prevalence of anemia on the national scale recently 22.7%[3] prevalence rate anemia is higher in Banggai Regency. The study was conducted in three sub-districts, namely Luwuk, North Luwuk and South Luwuk sub-districts in Banggai Regency, to determine the prevalence of anemia in preconception women. Anemia has been associated with poor health outcomes such as cognitive impairment, reduced work capacity, increased maternal morbidity and mortality, low birth weight, and increased fetal and neonatal mortality.

Anemia is a wide public health problem associated with an increased risk of morbidity and mortality. Among many factors, good nutrition (such as vitamins and mineral deficiencies), non-nutrients (such as infections and *hamoglobinopathies*, blood loss, and metabolic disorders) that contribute to the onset of anemia[4,5]. Although iron deficiency is a major cause of anemia,

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especially in women of reproductive age, anemia can also be caused by a lack of folic acid, vitamin B12, vitamin B6 and zinc status is also associated with the development and control of heme formation[5]. The point of determining *hemoglobin* for the diagnosis of anemia in women of reproductive age <12 g / dl.

In the human body iron deficiency is very common as the most common cause of anemia throughout the world. To better understand iron deficiency anemia, for the production of erythrocytes requires iron. Need a large amount of strong iron for erythrocytes and its precursors, further for the production of hemoglobin and heme. Iron is very important for the structure and function of hemoglobin[6].

The prevalence of anemia is still highly influenced by micronutrient deficiency as one of the factors in heme synthesis in the body. Vitamin B6 deficiency can block the initial enzymatic steps of heme synthesis and use of iron in *erythropoietic* cells. Vitamin B6 deficiency of the aminolevulinate synthase enzyme can cause iron refractory[7]. This study aims to determine the relationship between micronutrient intake and hemoglobin levels in preconception women.

MATERIAL AND METHOD

This research was conducted in Banggai Regency in 3 sub-districts; Luwuk, North Luwuk and South Luwuk from October 2016 to April 2017. This research was an observational study with cross-sectional design. The study population consisted of 132 pre-conception women who were included in the inclusion criteria, aged between 18-35 years, had never been pregnant and did not suffer from an infectious disease. The research population has been registered to be married at the Office of Religious Affairs (ORA) of Banggai Regency, Central Sulawesi. Mothers come to sign an informed consent, are willing to take part in the research, and attend the recruitment process. The research data used a questionnaire which included the average intake of micronutrients for iron, folate, vitamin B6, vitamin B12, zinc and Hb examination as primary data.

The research data was obtained from the study population who entered the inclusion criteria by interviewing using a questionnaire. Data collection on the average intake of micronutrients (iron, folate, vitamin B6, vitamin B12, zinc) using in-depth interview methods for daily food consumption, 24-hour recall of food, namely quantitative methods of food consumption surveys that can provide information about food and drinks consumed by the subject for 24 hours. The 24-hour Food Recall method is used to assess the consumption of food eaten and drunk for the past 24 hours, since waking up yesterday morning to sleep at night, a 24-hour recall should be done repeatedly and not consecutive days. Food consumption intake data can represent respondents' eating habits.

The respondents' micronutrient intake data were then processed using Nutrisurvey software, compared to the adequacy of micronutrient consumption based on the table of NAR 2013. The NAR is a reference for nutritional intake for Indonesia aimed at knowing the right daily nutritional intake for individuals in Indonesia. To see the level of adequacy of micronutrients respondents used two categories of inadequate if <77% NAR and adequate if ≥ 77% NAR[8]. The next step is measuring the hemoglobin level of the subject using the cyanmethemoglobin method.

Research data is processed and analyzed statistically. Univariate analysis was carried out by entering data and then explained the mean and standard intake of iron, zinc, folate, vitamin B6, vitamin B12, *hemoglobin* levels in preconception women. The relationship of each intake of micronutrients with Hb levels was analyzed using bivariate Pearson correlation test analysis.

RESULTS

Data obtained from the results of the study showed that some respondents did not suffer from anemia by 80% with an average hemoglobin level of 12.67 ± 1.24 g/dl. A total of 27 respondents (20%) suffered from anemia, and most of the anemia respondents had mild anemia of 77.8% while moderate anemia was 22.2% (**Table 1**).

Table 1: Distribution of hemoglobin levels of respondents

Category	n	%
Anemia (Hb<12g/dl)	27	20
Non Anemia (Hb>12g/dl)	105	80
Total	132	100

Table 2 shows the mean intake of micronutrients among study participants. There is no correlation between micronutrient intake and haemoglobin level of the respondents. However, Vitamin B12 shows the highest adequacy levels while folic acid is the lowest.

Table 2: Average intake of micronutrients and respondents, and the results of the correlation with hemoglobin levels

Variable	Mean ± SD	Min	Max	Adequacy Levels (%)	p
Fe	6.29 ± **4.2**	1.98	24.39	48.38	0.52
Vit B6	0.92 ± **0.38**	0.38	2.63	70.76	0.49
Vit B12	2.92 ± **2.18**	0.10	2.91	121.66	0.33
Folic Acid	97.80 ± **48.18**	22.0	283.30	24.25	0.48
Zinc	6.04 ± **2.61**	2.12	19.85	46.46	0.99
Hb level	12.68 ± **1.24**	7.3	15.9		

DISCUSSION

Women of childbearing age have low iron reserves, so women tend to be more vulnerable to iron deficiency when iron intake is reduced or when demand increases. If the intake of too little food contains iron and iron in the consumption of low bioavailability and iron reserves in the body are used continuously to meet the required iron requirements, the stored iron will be depleted and the body will be deficient in iron[9].

The form of iron consumed and other constituents in food greatly affect the absorption of iron. Iron derived from plant products is often consumed, while iron with bioavailable higher in heme iron is often consumed in small amounts. Non-heme iron is often poorly absorbed[10]. Haem iron can be obtained about 40% iron in meat, fish, poultry and is well absorbed by the body, about 60% of iron is obtained from animal tissues (liver). Iron from plants (fruits, vegetables, grains, beans) non haem iron forms is relatively difficult to absorb. The average iron intake of respondents is still less than the recommended NAR and the level of adequacy is adequate, reaching only 48.38%. After being processed using Nutrisurvey software, it turns out that the consumption deficit of iron, so that the process of hemoglobin synthesis still uses iron reserves in the body. The 24-hour recall results stated the lack of iron consumption in respondents because the majority of iron sources were obtained from non-haem iron, namely vegetables, fruits, cereals (rice, corn) and consumption of haem iron from fish and ungags. The average consumption of iron negatively correlates with hemoglobin levels. Respondents who were not anemic, the consumption of iron deficit and the possibility of respondents still having iron stores of ferritin in the liver for hemoglobin synthesis.

The results showed that the average intake of vitamin B6 from respondents was insufficient, still less than the recommended NAR and only reached 70.76% (<77% NAR). 24-hour recall analysis showed that vitamin B6 intake on average was lower, and consumption of vitamin B6 did not correlate significantly with hemoglobin. Vitamin B6 deficiency can block the enzymatic steps of initial heme synthesis and use of iron in erythropoiet5ic cells. Vitamin B6 deficiency of the aminolevulinate synthase enzyme can cause iron refractory Vitamin B6 acts as an enzyme cofactor in the process of heme biosynthesis. This vitamin must be sufficient for hemoglobin synthesis so that the heme formation process runs well, when its availability in the body is low it will interfere with globin synthesis and is not available for erythropoiesis[7].

The average intake of vitamin B12 respondents was good, and reached 121.66%. The results of a 24-hour recall show that the food source of vitamin B12 consumed by respondents is eggs, fish, and poultry. Further analysis showed that vitamin B12 intake did not correlate significantly. Although vitamin B12 intake

is good, but it does not directly increase hemoglobin levels, because micronutrients interact with each other to increase hemoglobin levels. Vitamin B12 plays a role in various metabolic as a coenzyme. Vitamin B12 (cobalamin), the active form of cobalamin as methylcobalamin, coenzyme synthase methionine, an enzyme involved in the synthesis of methionine and tetrahydrofolate from methyl tetrahydrofolate and homocystein. This is where the folate and cobalamin (vitamin B12) metabolic pathways meet and are called "folate traps" Cobalamin deficiency is usually caused by poor absorption of folate in the digestive tract[11].

Food sources rich in folate are wheat germ, yeast, innards (especially liver), cereals, and leafy vegetables. The folate content in food will decrease significantly when it takes too long to cook vegetables. Folate is a sensitive molecule that can be degraded by heat and oxidation. This is what causes folate deficiency to occur[12]. Lack of consumption of folate by respondents. Because of the lack of sources of food consumption of folic acid from respondents such as liver, and meat, which is not a habit of the respondent's diet. The results of 24-hour recall, the average intake of folate respondents was inadequate, still less than the recommended and only reached 24.25% (<77% NAR). Analysis showed that folate intake did not correlate significantly with hemoglobin NAR. Because folic acid is not biochemically active, folate is converted to tetrahydrofolate acid and methyltetrahydrofolate. This form of folic acid is transported by receptor-mediated endocytosis in cells to maintain normal erythropoiesis. Lack of folate and cobalamin (vitamin B12) ultimately causes thymidylate deficiency. DNA contains 2 pyrimidine bases (thymin and cytosine) and 2 purine bases (adenine and guanine). When thymidylate or thymine is deficient in position in the strand the DNA will be replaced by uracil. When uracil units in the structure of DNA, repair enzymes know and try to repair DNA. If it fails to repair DNA abnormal DNA synthesis or apoptosis will occur, which will cause erythropoiesis to be ineffective[11].

Foods that contain lots of zinc come from animals, especially meat. Other foods rich in zinc are legumes, whole grains, nuts, and seeds. Heme formation can be disrupted if the body suffers from zinc deficiency and this usually occurs due to insufficient need for zinc[13]. The average zinc consumption of respondents was less than the recommended NAR and the level of adequacy was inadequate because it only reached 46.46% (NAR <77%). The results of the 24-hour recall analysis showed that respondents consumed fish, poultry and peanut groups as sources of zinc food. Zinc intake did not correlate significantly with hemoglobin. Zinc is involved in the synthesis of hemoglobin through the activity of zinc-dependent enzyme systems, namely aminolevulinic acid dehydrase which plays a role in heme synthesis, which occurs in the cytosol cell[14].

CONCLUSION

Preconception mothers are mostly at risk of lacking micronutrients such as iron, zinc, *folate*, vitamin B12, and vitamin B6 which can interfere with the formation of hemoglobin. Understanding the importance of nutrition is needed, through prenuptial counseling about the importance of nutrition for the health of pregnant women and their babies.

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REFERENCES

1. Nguyen PH, Young M, Gonzalez-CasanovaI, Pham HQ, Nguyen H,Truong TV, Nguyen SV, Harding KB, Reinhart AG, Martorell R, Ramakrishnan U. Impact of Preconception Micronutrie nt Supplementation on Anemia and Iron Status during Pregnancy and Postpartum: A Randomized Controlled Trial in Rural Vietnam. PLoS ONE. 2016; 11(12).
2. Banggai Regency Health Office. Health Report of Banggai Regency year 2007. Banggai Regency: DHO documents; 2008.
3. Ministry of Health. National Health Report year 2013. Jakarta: Ministry of Health Documents; 2014.
4. Kraemer K and Zimmermann MB. Nutritional Anemia. Basel: Sight and Life Press; 2007.
5. Fishman SM, Christian P, and West Jr. KP. The role of vitamins in the prevention and control of anaemia. Public Health Nutrition. 2000; 3(2), 125-150.
6. Miller JL. Iron Deficiency Anemia: A Common and Curable Disease. Cold Spring Harb Perspect Med 2013; 3(7).

7. Hisano M, Suzuki R, Sago H, A Murashima A, and Yamaguchi K. Vitamin B6 deficiency and anemia in pregnancy. European Journal of Clinical Nutrition. 2010; 64: 221–223.
8. Gibson, R.S., Ferguson, E.L. An interactive 24-Hour recalls for assessing the adequacy of iron and zinc intakes in developing countries. Washington DC: ILSI Press; 2008.
9. Gleason G and Scrimshaw NS. An Overview the functional significance of iron deficiency. In: Kraemer K and Zimmermann MB. Nutritional Anemia. Basel: Sight and Life Press; 2007: 45-58.
10. Backstrand JR, Allen LH, Black AK, Mata Md, and Pelto GH. Diet and iron status of nonpregnant women in rural Central Mexico. Am J Clin Nutr. 2002;76:156–64.
11. Castellanos-Sinco HB et al. Megaloblastic anaemia: Folic acid and vitamin B12. Rev Med Hosp Gen Mex. 2015;78(3):135-143.
12. Delchier N, Herbig AN, Rychlik M, Renard CMGC. Folates in Fruits and Vegetables: Contents, Processing, and Stability. Comprehensive Reviews in Food Science and Food Safety. 2016; 15(3): 506-528.
13. Hunt JR. Bioavailability of iron, zinc, and other trace minerals from vegetarian diets. Am J Clin Nutr. 2003;78(suppl): 633S–9S.
14. Gibson RS, Abebe Y, Stabler S, Allen RH, Westcott JE, Stoecker BJ, Krebs NF, and K. Hambidge M. Zinc, Gravida, Infection, and Iron, but Not Vitamin B-12 or Folate Status, Predict Hemoglobin during Pregnancy in Southern Ethiopia. J Nutr. 2008 March; 138(3): 581–586.

Policy and Role Analysis Integrated Health Education Centers for Non-Communicable Diseases Toward The Prevention and Controlling of Hypertension

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ABSTRACT

Integrated Health Education Center for Non-communicable Disease/IHEC for NCDs (Posbindu PTM) is a place of community participation for early detection, preventing and controlling hypertension of non-communicable diseases. *Posbindu PTM* is one of the promotional and preventive health efforts that is implemented in an integrated, routine, and periodic, and the non-communicable risk factors that are found immediately refer to basic health care facilities. It is necessary to examine the role of *Posbindu PTM* in controlling hypertension risk factors.

The study used a combination method approach with sequential exploratory design. Exploratory design was begun with the main qualitative method to know the knowledge, attitude and behavior of members of Posbindu PTM to hypertension. The results of qualitative and quantitative methods were analyzed to develop the Integrated Health Education Center for Non-communicable Disease/IHEC for NCDs *(Posbindu PTM)*.

People feel useful coming to *Posbindu PTM*, so want to come every month. The active community who came to *Posbindu PTM* increased their knowledge about Hypertension and PTM (non-communicable disease).

The community who actively coming to *Posbindu PTM* supported the behavior of preventing and controlling of hypertension. *Posbindu PTM* can play a role in controlling hypertension for active members.

Keywords: *Posbindu PTM, behavior, prevention of hypertension, Analysis Policy.*

INTRODUCTION

Non-communicable diseases (NCDs) has been the leading cause of death in Indonesia 71% in 2012, specially heart, diabetes, cancer and chronic respiratory diseases[1]. The non-communicable diseases (NCDs) can be prevented through effective intervention against risk factors, including: tobacco use, unhealthy diet, inadequate physical activity and alcohol use[2].

Non-communicable disease (NCDs), also known as chronic disease or lifestyle-related illness is not transmitted from person to person[3]. The effort of prevention and control of non-communicable diseases under development in Indonesia is Integrated Health Education Center for Non-communicable Disease/IHEC for NCDs (Posbindu PTM). The purpose of *Posbindu PTM* is to increase community participation in preventing and early discovery of non-communicable diseases risk factors.. The activities of the post are measurement of body weight, height, body mass index (BMI), abdominal circumference, and blood pressure, physical activity and/joint exercise and counseling.

WHO recommends a healthy lifestyle by eating lots of fruits and vegetables, reducing fat, sugar and salt intake as well as exercise[4]. The developing post is one

of the efforts to prevent and control non-communicable risk factors. The purpose of this research is to know the role of *Posbindu PTM* to increase knowledge, attitude and behavior to prevent and control hypertension and other non-communicable diseases.

MATERIAL AND METHOD

The study used a combination method approach with sequential exploratory design. Exploratory design was begun with the main qualitative method to know the knowledge, attitude and behavior of members of Posbindu PTM to hypertension. The finding results awere proved by quantitative methods to determine the knowledge, attitudes, behavior of members on prevention and controlling hypertension.

Qualitative Methode: 85 member informants who participated in 10 (ten) *Posbindu PTM* activities. The population in this study was members of *Posbindu PTM* in 10 districts/cities in Bengkulu Province. The number of samples in this study is determined based on the number of members of *Posbindu PTM* in selected districts/municipalities with stratified random sampling cluster sampling technique, based on the number of members of Posbindu PTM, mostly medium and very few. The number of members 1580 based on registration each month from 79 posts. The samples to measure hypertension with the criteria of visits at least 6 months regularly every month to *Posbindu PTM*. The number of samples to know the knowledge, attitude and behavior of 472 members with the way insedental sampling at the time of the implementation at *Posbindu PTM.*

RESULTS

Result of qualitative method with case study approach was at 10 Posbindu PTM. Preparation for the implementation of was done by cadre and public health center officers. Cadre invited the head of neighborhood association/head of hamlet to mobilize the community to utilize *Posbindu PTM*. The results of interviews with cadre were as follows:

Members Posbindu PTM every Friday morning doing gymnastics together in the public health center, integrated counseling post of non-communicable disease was held once a month every Friday on the third of the month. The activities include blood tests, weight measurement, and height once a month (Cadre Posbindu PTM F) ..

The members who actively come to *Posbindu PTM* feel the benefits of following the activities. They got knowledge about the risk factors and prevention of hypertension, and also checked up their health. *Postbindu PTM* activities begin with registration, measurement of height, weight, abdominal circumference, and blood pressure/ tension. Certain members check for instantaneous sugar, cholesterol and uric acid in the blood. Members get counseling who have hypertension risk and counseling about non-contagious diseases for all members. Counseling about the non-communicable diseases conducted every month aims to improve knowledge, change attitudes and behavior of society against hypertension and other non-communicable risk factors. Based on the interview result, one member said:

..The treatment, counseling, examination (height, weight, blood pressure, blood sugar, check up disease, medication, non-communicable diseases/ clean and healthy life behavior, every month comes to *Posbindu PTM* (Informant 2, *Posbindu PTM* B) ...

The Information from participants on the implementation of *Posbindu PTM* can be concluded, all say useful because it can know the condition of health, increase knowledge about hypertension and other non-communicable diseases, so every month trying to come to *Posbindu PTM.*

Qualitative results compiled by dependent and independent variable, knowledge about *Posbindu PTM*, hypertension and other PTM, and attitude, behavior of non-contagious diseases prevention can be seen in Table1.

Table 1: Knowledge, Attitude, Behavior toward *Posbindu PTM,* Hypertension and other commnucable diseases

Research Variables	**Category**	**Category**		**p *value***
		Prevention behavior of *PTM*		
		Less	Good	
Knowledge of non-coomunicable diseases	Less	72,6%	27,4%	0,000
	Good	30,4%	69,6%	
		Knowledge of *PTM* (non-communicable diseases)		
		Less	Good	
Behaviour of coming to *Posbindu PTM*	Less	40,5%	59,5%	0,002
	Good	24,2%	75,8%	

Knowledge of *PTM* (non-communicable diseases) with behavior of preventing hypertension and other non communicable diseases, statistical test analysis using chi square test obtained results p value 0,000 <p 0.05, with 5% confidence degree. Means there is a relationship of knowledge with behavior to prevent hypertension and other non-communicable diseases.

Bivariate statistical test analysis using chi square test obtained p value 0,000 <p 0.05 with 5% confidence degree. It means there is a relationship between behavior of coming to *Posbindu PTM* with behavior to prevent hypertension and other non-communicable diseases..

Multivariate analysis using General Linear Statistical Test Model Repeated Measures one group. The results of this analysis will show the decrease of normal hypertension members of the first month, second, third and so on can be seen in Table 2.

Table 2 : Analysis result of *General Linier Model Repeated Measures* Toward members with Normal Blood Preasure

Month	**Total n**	**n of Events**	**N**	**Percent**
1st	428	0	428	100%
2nd	428	24	404	94.4%
3rd	428	64	364	85.0%
4th	428	80	348	81.3%
5th	428	109	319	74.5%

Source : Processed Primer Data

DISCUSSION

The role of Posbindu PTM

Knowledge, Attitudes, and Prevention Behavior of *PTM*

The result of research showed there is correlation of knowledge with behavior of non-communicable diseases prevention and there is relationship of coming behavior to *Posbindu PTM* with behavior of prevention to non-communicable diseases. Increased public knowledge facilitatted officers in implementing the program, and improve community utilization. The NICE study (2008), the invasion of community involvement showed

patients were activated to take a larger share and control in managing their own conditions[5]. According to WHO (2015) integrated health services are managed health services and ensure the continuiy, including health promotion, disease prevention, diagnosis, treatment, disease management and rehabilitation on different levels of the health system as required[6]. Increased knowledge was associated with behavior to prevent hypertension and other non-contagious diseases. Green in Ashwell and Barclay (2009), said that the health of individuals or communities were influenced by two factors: a) behavioral factors and b) factors outside behavior (non-behavior). Furthermore, behavioral factors according to Green, grouped 3 (three) behavior change factors that predisposing (predisposing), enabling (enabling), reinforcing (reinforcement)[7].

The Health Belief Model (HBM) was developed to find out why people did or did not use the prevention services offered, and have grown to address new problems in prevention and detection (eg, screening) as well as lifestyle behaviors such as healthy living behaviors and injury prevention. The Health Belief Model (HBM) argued that health behavior was determined by two cognitions: the perception of disease threats and behavioral evaluation to counteract threats. Members who actively come to *Posbindu PTM* increased knowledge about preventing, controlling and the impact of *PTM*, so that the members having behavior to control hypertension.

The concept of Health Belief Model explains[8]. namely: 1) Perceived Severity is the subjective belief of individuals in the spread of disease caused by behavior or believe how dangerous the disease so as to avoid unhealthy behavior to avoid pain. Perceived severity also has a positive relationship with healthy behavior. If the perception of individual severity is high then he will behave in a healthy manner; 2) Perceived Benefits is a belief in the advantages of recommended methods to reduce the risk of disease.

Health Belief model developed on empowerment of *Posbindu PTM* to know whether the members actively use *Posbindu PTM* every month. The Health Belief model is most often applied to preventative and asymptomatic health issues such as cancer detection and early hypertension, and is relevant to interventions to reduce risk factors for cardiovascular disease[9].

In *Posbindu PTM* activities, members were given counseling about non communicable diseases including hypertension and given special counseling for members suffering from hypertension in detail described hypertension control efforts. According to Alsairafi (2010) the increased risk of physical inactivity in controlling hypertension in our study suggested that general practitioners should be used to prescribe strenuous physical exercise[10]. According to Muhamedhussein (2016) tried to show the level of hypertension and know the risk factors that could explain the high prevalence of hypertension[11]. Beigi (2014) said that educational interventions had a highly desirable effect on lifestyle modification and control of blood pressure. Control hypertension in the population requires public education programs to promote hypertensive awareness and lifestyle modification which it is an urgent need[12].

The relationship of coming behavioral to *Posbindu PTM* with the behavior of preventing hypertension had an impact on the decrease of hypertension members in the first, second, third, forth, and fifth month.. This strategy will address the behavioral and environmental factors associated with the prevention and control of high blood pressure to achieve three sub-goals (prevention, early detection and control of hypertension). There are three main strategies: public health promotion, health care system and system support strategy[13]..

Overall, this study determined the high prevalence of hypertension in the study population. Hypertension is associated with smoking, alcohol consumption, low physical activity, obesity, and diabetes. Community-based approaches to reducing hypertension and risk factors are important. Effective community-based prevention and control strategies can provide the best opportunity to avoid hypertension-driven health and economic consequences in Nepal[14]. Researchers recommend: 1) raising awareness of hypertensive patients about hypertensive risk factors is very important to be motivated to adopt healthy lifestyle behaviors in an effort to control the disease; 2) encourage hypertensive patients to change essential lifestyle behaviors including regular physical activity adoption, proper weight control, follow proper diet, stop smoking and alcohol, reduce stress as much as possible; 3) the focus must be on public education in understanding high blood pressure and its impact on public health; 4) understanding the status of patient knowledge and perception for modification of lifestyle behavior as an important factor in the control

of hypertension[15].

Policy Analysis Posbindu PTM

People who come every month follow the activities at *Posbindu PTM,* know the health condition, get knowledge about the effort to prevent, prevent the non-contagious diseases and feel the benefits of the implementation of *Posbindu PTM*. *Posbindu PTM* integrated with mobile public health center could modify factor, cultivate trust and action to take advantage at *Posbindu PTM*. WHO (2015) recommended a more people-centered and integrated health system to help build a more effective health system[6].

Following the activities of *Posbindu PTM* could modify the knowledge of factor because of counseling was given to the members, early detection of disease by performing measurements and blood tests such as blood sugar, cholesterol and uric acid and other examinations. This study showed that community-based lifestyle interventions delivered by trained field health workers may be a potential solution to combat hypertension and diabetes mellitus among middle-aged and elderly people in resource-poor environments[16].

Posbindu PTM is one of the main containers of the implementation of Healthy Living Community Movement (GERMAS). *Germas* is a systematic and planned action undertaken jointly by all components of the nation with awareness, willingness and ability to behave healthy to improve the quality of life. Most of the activities carried out on the post One of the activities of routine medical examination is the main activity of *Posbindu PTM* which strongly supports Germas.

Successful Germas, can not only rely on the role of the health sector alone. The role of Ministries and Institutions in other sectors also determines, and is supported by the participation of all levels of society. *Posbindu PTM* increase knowledge and understanding of society to behave "Cerdik" (Health Check periodically, Awake smoke cigarette, Diligent physical activity, Healthy diet with balanced nutrition, adequate rest and Manage stress). Activity Posbindu PTM will be able to improve the success of Germas which aims to increase awareness, willingness and ability of people to behave healthy, including controlling hypertenyiin an effort to improve the quality of life.

CONCLUSION

Posbindu PTM aimed to make early detection, prevent and control blood pressure of the members. The activities of *Posbindu PTM* performed the measurement of blood pressure, non communicable diseases including hypertension, counseling for members indicated by non-communicable disease based on examination and measurement results.. Active members felt useful following *Posbindu PTM*, and they always want to come every month. The members who were suffering from hypertension and actively come every month could control blood pressure down to 74.1% of patients in the fifth month. The role of *Posbindu PTM* with the activities of measuring blood pressure, height, body weight, counseling/education, counseling for hypertension indicated members could improve knowledge and healthy behavior to control members with active hypertension. *Posbindu PTM* is one of the main containers of the implementation of Healthy Living Community Movement (GERMAS).

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REFERENCES

1. (WHO) World Health Organization, 2014. Global status report on noncommunicable diseases 2014
2. (WHO) World Health Organization, 2013. Informal note on the draft outline of the report of WHO on progress achieved in realizing the commitments made in the UN Political Declaration on NCDs.
3. European Society of Lifestyle Medicine (ESLM), 2014. Research, Treatment and Prevention of Lifestyle-related Chronic Diseases-Noncommunicable Diseases (NCDs)
4. (WHO) World Health Organization, 2014. Noncommunicable Diseases (NCD) Country Profiles, 2014.

5. NICE, 2008. Community engagement to improve health. London: National Institute for Health and Clinical Exce
6. (WHO) World Health Organization, 2015. WHO global strategy on people-centred and integrated health services. ©World Health Organization. All rights reserved.
7. Ashwell, HES., Barclay, L, 2009. A retrospective analysis of a community-based health program in Papua New Guinea. Health Promotion International, Vol. 24 No. 2.
8. Hayden, J, 2014. Instroduction to Health Belief Model. Chapter 4. Health Belief Model Jones and Bartlett Publisher..
9. Mutulei, ACN, 2013. Factors Influencing the Uptake of Intermittent Preventive Treatment for Malaria in Pregnancy: Evidence from Bungoma East District, Kenya. *American Journal of Public Health Research.Vol. 1. No.110—123*
10. Alsairafi, M., Alshamali K., Al-rashed A, 2010. Effect of Physical Activity on Controlling Blood Pressure among Hypertensive Patients from Mishref Area of Kuwait., Eur J Gen Med. 7(4):377-384.
11. Muhamedussein, MS., Nagri, ZI., Manji, KP, 2016. Prevalence, Risk Factors, Awareness, and Treatment and Control of Hypertension in Mafia Island, Tanzania. International Journal of Hypertension Vol.
12. Beigi, MAB., Zibaeenezhad, MJ., Aghasadeghi, K., Jokar, A., Shekarforoush, S., KhazraeiH H, 2014. The Effect of Educational Programs on Hypertension Management. Int Cardiovasc Res J.8(3):94-98.
13. Ofili, MI., Ncama, BP, 2014. Strategies for Prevention and Control of Hypertension in Nigeria Rural Communities. Biomedical & Pharmacology Journal Vol.7. (1),39-45.
14. Dhungana, RR., Pandey, AR, Bista, B., Joshi, S., Devkota, S, 2016. Prevalence and Associated Factors of Hypertension: A Community-Based Cross-Sectional Study in Municipalities of Kathmandu, Nepal. International Journal of Hypertension Vol. 2016.
15. Kilic, M., Uzunçakmak, T., Ede, H, 2016 .The effect of knowledge about hypertension on the control of high blood pressure. International Journal of the Cardiovascular Academy 2.27–32
16. Lin A., Zhang G., Liu Z., Gu J., Chen W., Luo F, 2014. Community-Based Lifestyle Intervention for Reducing Blood Pressure and Glucose among Middle-Aged and Older Adults in China: A Pilot Study. Int. J. Environ. Res., Public Health. 11. 11645-11663.

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A Robust Trust Model for Wireless Sensor Networks

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***Abstract*— Wireless Sensor Networks (WSNs) are vulnerable to various security attacks due to its broadcast nature. Trust management is one of the effective methods to defend against threats posed to WSN. The trust management system helps to mitigate many insider attacks and malicious behaviour of nodes. In this paper, we proposed a robust trust model that prevents various attacks viz; bad mouthing, self-promoting and collusion attacks. It uses the time lapses function based on forgetting curve to calculate direct trust and reputation function for indirect trust. Our proposed trust model is scalable. When the trust value is above the threshold value, then we consider a communication link as active and node is trusted, otherwise we remove the communication link and mark the node as malicious. The simulation results indicate the effectiveness of proposed method and maximizes the defence against the internal attacks.**

Keywords—WSNs, trust management, direct trust, indirect trust, time decay function.

I. INTRODUCTION

A WSN consists of multiple detection devices called sensor nodes, each of which is small, lightweight and portable. Every sensor node is equipped with a transducer, microcomputer, transceiver and power source. The transducer generates electrical signals based on sensed physical effects and phenomena. The microcontroller processes and stores the sensor data. The transceiver receives commands from a central computer and transmits data to that computer [1][2]. The power for each sensor node is derived from a battery. WSN can be usually divided into two categories: distributed sensor networks and hierarchical sensor networks [3]. A distributed sensor network is composed of sensor nodes and sink node. On the contrary, a hierarchical sensor network has at least one immediate layer with header nodes. It is thus composed of sensor nodes, header nodes viz; forwarding nodes and sink node. The header nodes and the sink node are different from the sensor nodes in energy, memory and computational capability.

The applications of WSNs are widely used in industry automation, agriculture fields, healthcare applications, military applications, robotics etc. Most of the path finding challenges is faced by WSN in terms of security, node deployment, energy consumption, communication range, fault tolerance, quality of service, etc. The security of WSNs is getting more attention because economic loss and privacy issue. [4] [5].

A WSN shows some specific characteristics such as dense deployment of nodes, dynamic topology of network, low duty cycle, limited battery power, multi-hop communication. In WSN, sensor nodes may be homogeneous or heterogeneous, and self-configurable also sensor nodes can either be stationary or mobile. When sensors are distributed in a hostile environment, then there is a threat of different malicious attacks due to its broadcast nature. For example, an adversary can analyse the traffic pattern and take stupid action against the network. There are various types of threats present in WSN. The resource efficiency and dependability of a trust system should undoubtedly be the most fundamental requirements for any WSN including clustered WSNs. However, existing trusts systems developed for clustered WSNs are incapable of satisfying these requirements because of their high overhead and low dependability.

A. Trust

Many definitions of trust are proposed by the authors. Trust is defined as the level of belief that is developed by past interaction and behaviour between source and destination node. Trust has made impact on future route selection and communication [6][7].

- *Direct Trust*

  The direct trust establishes between source node and neighbor nodes. The direct communication between nodes helps to evaluate the direct trust. It has more impact than indirect and recommendation based trust.

- *Indirect Trust*

  When the source node cannot directly connect to target node and observes the behaviour of target node through other nodes. This is the combinations of feedback and recommendations of other nodes.

- *Recommended Trust*

  Recommendation is the part of indirect trust where the neighbours of target node are given feedback about that node. It is based on the trust record of direct neighbors about the target node on the basis of their experiences with target node.

Based on the behaviour of the adversary node, some security attacks can be defined as follows [8][9]:

- *Black hole:* In Black hole attack, a node falsifies the route of network and attracts all the packets and routing information towards itself.

- *Selective forwarding:* This type of attack consists of a malicious node which behaves like a router and drops

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some packet and may deny to forward that packet or messages.

- *Bad Mouthing attack:* In this type of attack, the malicious node gives the wrong information about the neighbor node.
- *DoS attacks:* In Denial of Service (DoS) attack the malicious node injects bad information to mislead the network. Here, the bad node provides the wrong reputation and feedback about other nodes.
- *Sybil attack:* Here the malicious node has many Ids and behaves as like many nodes.
- *Collusion attack:* In this type of attack more than one malicious node give false information and feedback about good node.

The rest of the paper is organised as follows. Section 2 gives the literature survey about previously proposed trust models in WSN. Our proposed scheme has explained in section 3. Section 4 explained the simulation of proposed model and conclusion is presented in Section 5.

II. RELATED WORK

The research into building trusts either direct or indirect is based on eigen values, entropy, packets delivery, recommendation, and may other parameters [9].

Ganeriwal *et al*. [10] proposed a trust model based on reputation for high integrity sensor networks. This model includes five parts: direct trust based on reputation, indirect trust evaluation, synthesis of reputation, conversion and behaviour of node trust. In their model, they had used Beta distribution and Bayesian formula to update and calculate the trust.

Gheorghe *et al*. [11] proposed an intrusion detection approach based on adaptive trust management protocol. This protocol includes three phases: Learning phase, exchanging phase and Updating phase. In Learning phase, experiences are developed. In exchanging phase, the nodes have shared their experiences with each other. In update phase, reputation has been updated based on experiences.

Jiang *et al.* proposed an Efficient Distributed Trust model (EDTM) [12] for WSNs. EDTM uses number of packets for trust calculation. The direct trust and recommendation-based trust is calculated using number of packets transferred between nodes. This is the efficient mechanism to calculate the trust in distributive environment of WSN.

In some models [13-15], the number of packets transferred between nodes has been used to calculate the trust. This method establishes secure route between source node to sink node. It helps to find the secure neighbor node. In this method, the recent transmission of packets has more weight than older transmissions.

Li *et al.* [16] proposed Lightweight Dependable Trust System (LDTS) for WSNs. They had applied this approach in hierarchical sensor networks. This method establishes the trust relationship between Cluster head node and Normal sensor node, Cluster head to another Cluster head and Cluster head to Sink node. This method uses simple mathematical calculation to make this model lightweight.

Tan *et al.* [17] has proposed Iterative and Dynamic Trust model (IDTrust) based on three layered distributed trust communication architecture. In this iterative model, a global trust has been presented with the help of direct and indirect trust. This iterative and dynamic trust model improves the efficiency of the P2P networks. Hongjun et al. [18] [20] proposed a trust model based on entropy. Here the trust is shown as an entropy. When a node performs some action, then entropy is changed. This entropy has been mathematically modeled and the quantitative evaluation of the trust is done in WSN.

III. PROPOSED MODEL

There are two types of node in WSN: source node and target node. The main focus of this paper is to develop a secure model which should also be energy efficient and robust. This paper uses direct trust, recommendation-based trust, time lapses function and threshold to mitigate the malicious nodes and thereby securing the WSN.

The trust is combination of direct trust and recommendation-based trust (indirect trust). In this model, following assumptions are made:

- The recent conversation has more weight than past conversation.
- The value of weight is negligible if the conversation is too old.
- Direct trust has more weight than recommendation-based trust.

The curve of forgetting is discovered by Hermann Ebbinghaus The decay function has features that the aging will decline at some extent. The forgetting function reflects the timeliness and evaluation. At start, the timeliness lapses fast but after a period of time, it will slow.

A. Direct Trust

The direct trust is the trust from source node to target node based on its previous communication experiences. The satisfaction 'S' is a comprehensive evaluation about the target node which is based on energy, robustness, delivery speed, reliability etc. We divided the satisfaction at five levels as follows [19]:

TABLE 1. SATISFACTION LEVEL

Trust value	**Meaning**
0	Distrust
0.25	Untrust
0.5	Low trust
0.75	Trust
1	High trust

The mapping function S(x) is

$$ST(x) = \begin{cases} a_1, & if\ x = High\ Trust, \quad a_1 = 1 \\ a_2, & if\ x = Trust, \quad 0.75 \le a_2 < a_1 \\ a_3, & if\ x = Low\ Trust, \quad 0.5 \le a_3 < 0.75 \\ a_4, & if\ x = Distrust, \quad 0.25 \le a_4 < 0.5 \\ a_5, & if\ x = Distrust, \quad 0 \le a_5 < 0.25 \end{cases}$$

Here we use time decay function to calculate trust about target node and it depends on time factor. The recent conversation has more effect in direct trust.

$ST(x)$ uses as a current trust value according to transaction between source node and target node and $ST(x) \in [0, 1]$.

So, we calculated the direct trust

$$T_{dir}^{n}(i,j) = \begin{cases} k\left(ST(x)\right) + (1-k)T_{dir}^{n-1}(i,j) & X \neq 0 \\ 0 & X = 0 \end{cases}$$

where $T_{dir}^{n}(i,j)$ is the direct trust of node 'i' on node 'j' at n[th] transaction between node 'i' and node 'j'. k is the time lapses function proposed by Tan *et al.*[17] and is defined as the dynamic factor and it changes according to the following equation:

$$k = \begin{cases} 1 - \left(\frac{t_{n-1}-t_1}{t_n-t_1}\right)^2, & \text{If } t_n > t_1 \\ 1, & otherwise \end{cases} \quad (1)$$

The value of k is more if the transaction is more recent. The value of k is less if transaction had been established long period ago.

B. Indirect Trust

The recommendation-based trust calculated by direct observation obtained from a target node neighbors. Here, we used cluster head as a recommendation manager. The recommendation manager has mainly three roles:

- Sends recommendation request to neighbors of target node.
- Collects responses from neighbor nodes and filtering the anomaly value.
- Sends the recommendation value to source node.

When any source node 'i' wants the recommendation value of target node 'j' from recommendation manager, then the recommendation manager calculates the indirect trust by all neighbour nodes of target node [19] using the following Equation.

$$IDT_{i,j} = \sum_{k=1}^{n} \frac{P_{k,j}}{P_{k,j}+N_{k,j}} \quad (2)$$

where,

$P_{k,j}$ is the positive recommendation of node k to node j and

$N_{k,j}$ is the negative recommendation of node k to node j.

C. Forgetting Curve

The forgetting curve is defined as

$$c = e^{-\beta\frac{\Delta t}{\gamma}} \quad (3)$$

where c is the decay function,

Δt is time difference between evaluation period,

β = time decay factor and

γ = cycle in forgetting curve.

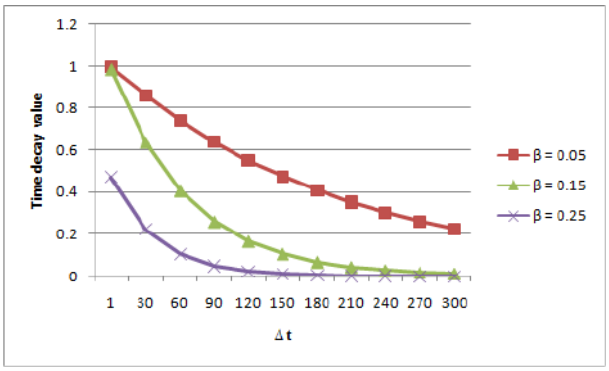

Figure 1. Time decay factor

The value of β depends upon the mapping function of satisfaction ST(x). It is the time decay factor [19].

D. Evaluation of Total Trust

In our approach, $T_{i,j}$ denotes total trust between node 'i' and node 'j' at a particular time t. It is the addition of direct trust and indirect trust. The direct trust is $T_{dir}(i,j)$ and the indirect trust $T_{IDT}(i,j)$ is calculated for a network in each round of communications.

The trust value of target node is compared by the threshold value (T_{Th}). If the trust value ($T_{i,j}$) of target node is greater than the threshold value (T_{Th}) then the node is selected for communication otherwise that node is malicious. The node's integrated quantitative total trust is calculated as follows:

$$T_{i,j} = c\,T_{dir}(i,j) + (1-c)\,T_{IDT}(i,j) \quad (4)$$

where 'c' is the value of forgetting curve and $c \in (0,1)$ balances the value of direct trust and indirect trust. If c =1, $T_{dir}(i,j)$ is equal to direct trust. If $c = 0$, then $T_{IDT}(i,j)$ comes from the indirect trust. Figure 3 depicts the Robust trust model for wireless sensor network. This model has following phases which are illustrated below:

Phase 1: Consider a cluster of a sensor network as given in Figure 2, where A, B, P, Q and R is the normal sensor nodes while CH is the cluster head of that cluster. If the source node A wants trust value of target node B, then trust value is calculated as follows:

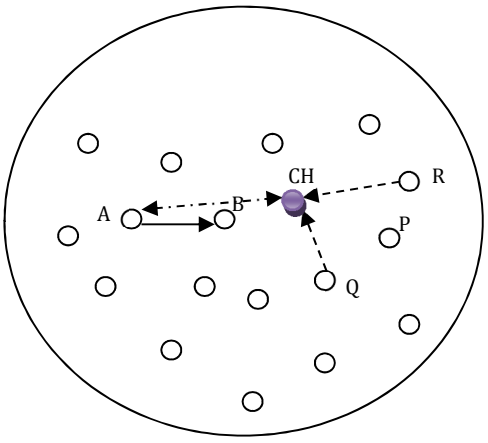

Figure 2. Cluster in WSN

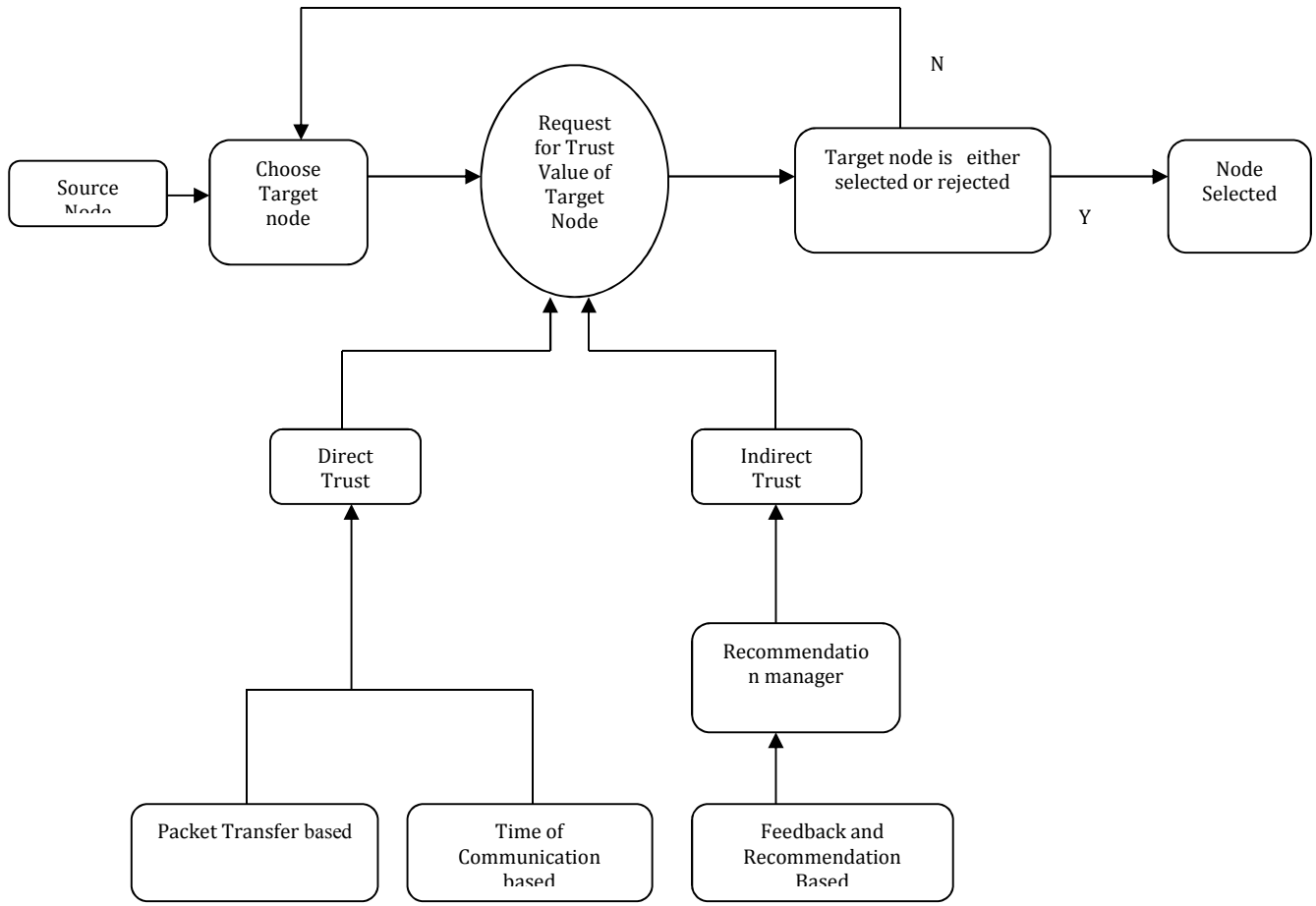

Figure 3. Proposed Trust Model

- If any past transaction is not available between node A and B, then the cluster head provides recommendation value of indirect trust to node A. Otherwise, the direct trust value is calculated between node A to B by $T_{dir}^{n}(A,B)$.
- If there is no recommendation value of indirect trust available on cluster head (CH) about node B then the $T_{dir}^{n}(A,B)$ is the Total trust value $T_{A,B}$.
- Suppose A wants trust value of node P, then there is no direct trust available. Therefore, the recommendation value of node P is provided by the neighbor nodes Q and R to cluster head (CH). After that the cluster head send response to node A. In this network, the cluster head (CH) works as a Trust Manager.

Phase 2: The total trust $T_{i,j}$ is aggregation of direct trust $T_{dir}^{n}(i,j)$ and indirect trust $IDT_{i,j}$.

Phase 3: The trust value of target node is received by source node. The source node compares this current trust value $T_{i,j}$ with the threshold value (T_{Th}). If it gives true value, it means the node is trustworthy otherwise, we discard this communication link.

IV. Simulations and Result

In order to prove robustness and efficiency of the proposed scheme, we simulated our proposed model. Here, we consider satisfaction level of nodes from Table 1. The increment and decrement of trust is based on successful transmission of packets from source node to target node and mitigate the malicious node. Our Robust trust model's performance is more secure and efficient compared with traditional model. We had taken the scenario where the packet transfer efficiency is continuously increasing, decreasing or both. Consider Table 2 where the various packets reaching probability (PPRS) is illustrated.

TABLE 2. Probability of packet delivery

Timestamps	probability of Packet reached successfully (PPRS)		
10	A	B	C
20	0.5	0.95	0.95
30	0.55	0.9	0.7
80	0.6	0.85	0.85
100	0.65	0.8	0.75
120	0.7	0.75	0.55
140	0.75	0.7	0.9
160	0.8	0.65	0.65
170	0.85	0.6	0.76
180	0.9	0.55	0.55

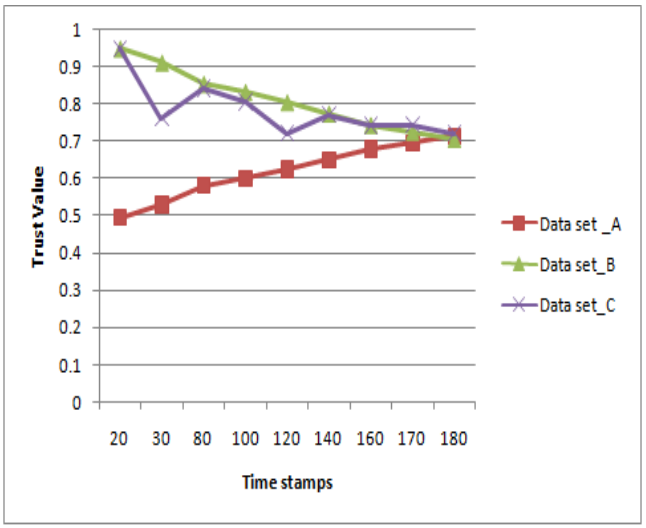

Figure 4. Trust Value of target node

In data set A, the value of PPRS is continuously increasing the packet transfer probability. In data set B, the value of PPRS is continuously decreasing. In data set C, the PPRS has uncertain value. In Figure 4 our trust model successfully shows the increment and decrement of trust values of node according to time decay function and packet transfer probability.

V. Conclusion and Future Direction

There are many security challenges in WSN in terms of internal threats, outsider threats, node deployment, energy consumption, communication range, fault tolerance, quality of service, etc. We had proposed a robust trust model for a cluster-based network to secure against collusion attack. The direct trust is calculated by simple mathematical operations which makes our approach lightweight. The trust is updated dynamically and has more weight on recent transactions. The calculation of trust is fully depend upon the packet transaction among nodes. We assume that the environmental factor is constant during transaction. The cluster head plays as recommendation manager which helps to calculate indirect trust of any node. Overall the proposed method has efficient and robust trust model to secure WSN from insider attacks. The proposed model can be used to detect and prevent various types of attacks like intrusion detection and other attacks.

VI. References

[1] T. Luo, S. S. Kanhere, J. Huang, S. K. Das, and F. Wu, "Sustainable Incentives for Mobile Crowdsensing : Auctions , Lotteries , and Trust and Reputation Systems," no. March, pp. 68–74, 2017.

[2] F. Ishmanov, A. S. Malik, S. W. Kim, and B. Begalov, "Trust management system in wireless sensor networks: design considerations and research challenges," Transactions on Emerging Telecommunications Technologies, vol. 26, no. 2, pp. 107–130, 2015.

[3] R. A. Shaikh, H. Jameel, B. J. d'Auriol, H. Lee, S. Lee, and Y.-J. Song, "Group-based trust management scheme for clustered wireless sensor networks," IEEE Transactions on Parallel and Distributed Systems, vol. 20, no. 11, pp. 1698–1712, 2009.

[4] U. Prathap , D.P Shenoy, K. R. Venugopall. "WSNapplica-tions and routing protocols: survey and research challenges". "In: Proceedings of the 2012 IEEE international symposium on cloud and services computing (ISCOS), p.49–56,2012.

[5] Shashikala, C. Kavitha, "A survey on secured routing protocols for wireless sensor network ". "In Proceedings of the 2012 IEEE third international conference on *Computing Communication & Networking Technologies (ICCCNT), 2012*..

[6] K. Govindan and P. Mohapatra, "Trust computations and trust dynamics in mobile adhoc networks: a survey," IEEE Communications Surveys and Tutorials, vol. 14, no. 2, pp. 279– 298, 2012.

[7] A. Josang, R. Ismail, and C. Boyd, "A survey of trust and reputation systems for online service provision," *Decis. Support Syst.*, vol. 43, no. 2, pp. 618–644, 2007.

[8] Pathan, Al-Sakib Khan, H. W. Lee, and C. S. Hong. "Security in wireless sensor networks: issues and challenges." In *Advanced Communication Technology, 2006. ICACT 2006. The 8th International Conference*, vol. 2, pp. 6-pp. IEEE, 2006.

[9] Han, Guangjie, Jinfang Jiang, Lei Shu, Jianwei Niu, and Han-Chieh Chao. "Management and applications of trust in Wireless Sensor Networks: A survey." *Journal of Computer and System Sciences* 80, no. 3, 602-617.2014.

[10] S. Ganeriwal, L. K. Balzano, and M. B. Srivastava, Reputation-based framework for high integrity sensor networks. *ACM Transactions on Sensor Networks (TOSN)*, *4*(3), 2008.

[11] Gheorghe, Laura, Razvan Rughinis, and Razvan Tataroiu. "Adaptive trust management protocol based on intrusion detection for wireless sensor networks." In *Networking in Education and Research, 2013 RoEduNet International Conference 12th Edition*, pp. 1-7. IEEE, 2013.

[12] Jiang, Jinfang, Guangjie Han, Feng Wang, Lei Shu, and Mohsen Guizani. "An efficient distributed trust model for wireless sensor networks." *IEEE transactions on parallel and distributed systems* 26, no. 5 : 1228-1237.2015.

[13] W. Cheng, X. Liao, C. Shen, S. Li, and S. Peng, "A trustbased routing framework in energy-constrained wireless sensor networks," in Proceedings of the International Conference on Wireless Algorithms, Systems, and Applications (WASA '06), pp.478–489, Xi'an, China, August 2006.

[14] C. J. Fung, J. Zhang, I. Aib, R. Boutaba, and R. Cohen, "Design of a simulation framework to evaluate trust models for collaborative intrusion detection," in Proceedings of the International Conference on Network and Service Security (N2S '09), pp. 13–19, IFIP, Paris, France, June 2009.

[15] Fang, Weidong, Chuanlei Zhang, Zhidong Shi, Qing Zhao, and Lianhai Shan. "BTRES: Beta-based Trust and Reputation Evaluation System for wireless sensor networks." *Journal of Network and Computer Applications* 59 : 88-94. 2016.

[16] Li, Xiaoyong, Feng Zhou, and Junping Du. "LDTS: A lightweight and dependable trust system for clustered wireless sensor networks." *IEEE transactions on information forensics and security* 8, no. 6 : 924-935. 2013.

[17] Tan, Zhenhua, X. Wang, and X. Wang. "A novel iterative and dynamic trust computing model for large scaled P2P networks." *Mobile Information Systems* 2016 2016.

[18] D. Hongjun, J. Zhiping, and D. Xiaona, "An entropy-based trust modeling and evaluation for wireless sensor networks", International Conference on Embedded Software and Systems, ICESS, pp. 27-34, 2008.

[19] J. Xie, J. Zhong, and P. Deng. "A robust trust management model for E-commerce system." In *e-Business Engineering (ICEBE), 2014* IEEE 11th International Conference on, pp. 170-176. IEEE, 2014.

[20] P. R.Vamsi and K.Kant, "An improved trusted greedy perimeter stateless routing for wireless sensor networks," International Journal of Computer Network and Information Security, vol. 6, no. 11, pp. 13–19, 2014.

MEMORANDUM OF UNDERSTANDING

BETWEEN CENTUM FOUNDATION AND IMS Engineering College

This Memorandum of Understanding (hereinafter referred to as "MOU") is made and entered into by and between the **CENTUM FOUNDATION** whose address is 127, Neelagagan, Mandi Road, Sultanpur, Mehrauli New Delhi -110030 and the IMS Engineering College, whose address is National Highway 24, Near Dasna, Adhyatmik Nagar, Ghaziabad, Uttar Pradesh 201009

Purpose: The purpose of this MOU is to establish the terms and conditions under which the program will meet and function. This includes the deliverables from CENTUM side and the IMS Engineering College.

Term of MOU: This MOU is effective from today (1st June 2018) till 31st of March 2019.

1. **Responsibilities of CENTUM:**

   As per the understanding between CENTUM and IMS Engineering College the following are the deliverables from CENTUM side.

- CENTUM has agreed to train the proposed set of candidates for a period of 42 days (please mention hours or put both) as per the schedule shared with the College.
- CENTUM is responsible to provide the training for the candidates on the requisite topics for the duration which is committed by deploying trainers at its expense.
- CENTUM is responsible for helping the assessment agency in doing baseline, midline and endline assessment
- CENTUM would shortlist the students after the end-line assessment on the basis of knowledge, performance & attendance. Only students who fulfill the required criteria will be allowed to sit through final assessment.
- CENTUM is responsible to schedule the final assessments at the end of the program in collaboration with the third party assessment agency and NASSCOM Foundation
- CENTUM would work along with the placement team of the college as well as NASSCOM Foundation to provide job opportunities to the beneficiaries of this program.

Professor & Head
Department of Computer Sc.
I.M.S. Engineering College

2. **Responsibilities of IMS Engineering College :**
As mutually agreed, the following are the deliverables from the side of IMS Engineering College.

- College has agreed to provide all pre-requisite infrastructure support for the program such as classroom, Projector, Lab with internet connection.
- College will designate a SPOC from their side who would take care of all needs during the program.
- College has agreed to arrange the boarding and lodging of the trainers during the course of the program.
- College has agreed to share the details of the candidates in written who have been placed through campus recruitment under Arise Program. This would be done by sharing copy of Appointment letters.
- College has agreed for at least 20% buffered days to provide extra training if required for the program.
- College has agreed to provide placement opportunities for the candidates through the upcoming placement program or job fair which would be conducted by NASSCOM or CENTUM.
- College has agreed to adhere to the session plan submitted at the beginning of program.
- College has agreed to put strict guidelines in place for the students so that there is minimal dropout and absenteeism.

CENTUM FOUNDATION

Name: AKHILESH KUMAR SONI Signature:

Date: 06/06/2018

IMS Engineering College

Name: Pankaj Agarwal Signature:

Professor & Head
Department of Computer ...
I.M.S. Engineering ...
Ghaziabad

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&

Indian Testing Board (ITB), A-108B, Sector-58, Noida

This MEMORANDUM OF UNDERSTANDING (hereinafter referred to as MOU) is made on 6th day of MAY 2015 between **IMS Engineering College**, Ghaziabad incorporated under the laws of India and having its registered office at NH-24, Adhyamik Nagar, Near Dasna, Ghaziabad, and Uttar Pradesh-201009, hereinafter referred as **"INSTITUTE"**

AND

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School of Applied Learning in Testing (SALT), A-108B, Sector-58, Noida

6/5/15

ITB is the International Software Testing Qualifications Board (ISTQB) approved national board of India, responsible for the "ISTQB-Certified-Tester" Certification in India, founded in February 2004

SALT, pioneered and steered by world-renowned experts in the software engineering, Management, pedagogy and learning technologies established in 2011.

Hereinafter **Indian Testing Board (ITB) would be referred as 'Knowledge Partner'**

The parties wish to enter into an agreement, for selected students, in respect to establishing a **Test Lab as known as Test Centre of Excellence** in IMSEC. The Test Lab will do the following:

a. Shall conduct professional Software Testing Training of 120 hrs
b. SALT based skill assessment for the students undergoing training
c. Conduct ISTQB foundation level examination

In addition, A **Certified Mobile Professional lab (CMAP Lab)** will also be established under the Test Lab that will offer certification in Mobile Development and Testing including Automation, Performance and Security.

The parties have entered into this **MoU** to strengthen **Industry-Academia Interface** & develop Industry oriented technical skills among students & faculty.

Now therefore both the parties hereby agree as follows:

1.1. **KNOWLEDGE PARTNER** will establish Test Lab to be named as **'Test Centre of Excellence'** under **'Centre of Advanced Computer Learning & Development'** of Computer Science & Engineering department at IMSEC, whereas IMSEC will provide necessary infrastructure resources for the training including existing computers and projection systems .

1.2. The **INSTITUTE** in collaboration with **KNOWLEDGE PARTNER** will work together by promoting industry oriented learning & skill development of students through self developed programs & courses.

1.3. Knowledge partner will provide necessary resources & help the students for industry oriented certification programs.

1.4. **KNOWLEDGE PARTNER** will also be responsible for skill enhancement of faculty & staff through various learning & development programs.

1.5. **KNOWLEDGE PARTNER** will share the expertise on latest IT technologies among students of IMSEC for developing industry oriented projects.

1.6. Both the partners will work in the direction of organizing IT related conferences **at** IMSEC to provide a platform for technocrats from various industries to share their expertise & contributions.

1.7. Both the partners will work together towards the all round development of students & employees of both the companies through knowledge sharing.

FOR INDIAN TESTING BOARD

Vipul Kocher (President)

FOR IMS ENGINEERING COLLEGE

Dr. Pankaj Agarwal, HoD, CSE Dept, IMSEC

6/5/15

Netcamp Solutions Private Limited
CIN – U74900WB2013PTC193456
P-130, Jadunath Sarkar
(Lake Terrace) Road,
Kolkata-700029
www.netcamp.in

an ISO 9001:2015 Company

Date: 1st June, 2020

Memorandum of Understanding

This Memorandum of Understanding is made between **Department of Computer Science & Engineering of IMS Engineering College, Ghaziabad and Netcamp Solutions Private Limited**.

Now this MOU witnesses as under

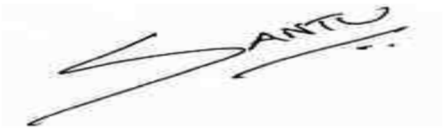
1. Scope of the MOU

Netcamp in collaboration with Department of Computer Science & Engineering of IMS Engineering College, Ghaziabad will conduct student internships, industrial visits, guest lectureship, projects, placements, research and development, consultancy, workshops.

Netcamp will provide the necessary resource person and the Institute will share the necessary infrastructure for the above activities as applicable.

2. Validity of this MOU

The validity of this MOU will be for One Year from the date of signing. The MOU may be renewed through a new MOU on completion of 1 year on such terms mutually agreed between the parties.



Dr. Pankaj Aggarwal

HOD

Computer Science Engineering

IMS Engineering College, Ghaziabad

Santu Purkait

Director

Netcamp Solutions Private Limited

SAP SE
Dietmar-Hopp-Allee 16
69190 Walldorf
Deutschland
T +49 6227 7-47474
F +49 6227 7-57575
info@sap.com

SAP SE, Dietmar-Hopp-Allee 16, 69190 Walldorf

Dear Sir or Madam,

We welcome you as a new member in our SAP University Alliances Program.

SAP University Alliances is a global program with more than 3,200 member institutions in over 111 countries that aims to shape the future of higher education. The program exposes students and faculty to the latest SAP technologies and enables universities and vocational schools to integrate SAP software into their teaching by partnering to build technology skills.

SAP University Alliances Program members have access to a wealth of resources developed in collaboration with faculty, students, and SAP partners and customers around the world.

As an associate member, you have access to:

- SAP University Alliances curricula
- Demos, Webinars and recordings
- Community membership
- Events and competitions
- Learning platforms

With full membership, you get all the benefits of the associate membership, as well access to:

- The entire SAP license portfolio
- Partnership hosting and maintenance of SAP solutions through University Competence Centers (UCCs)
- First- and second-level-support through University Competence Centers
- Preferential invitation and participation in events

As a next step, you should register for the SAP Learning Hub, academic edition to get access to the curricula and other learning materials as well as the community forums. We recommend that at any point in time 3 lecturers from your institution should be registered to maintain continuity.

By scanning the QR code on the enclosed card and flyer, you will find more detailed information about the SAP University Alliances Program and the SAP Learning Hub academic edition.

Best regards,

SAP University Alliances Team

SAP University Alliances · SAP next-gen · SAP Education Network for Digital Transformation · SAP Young Thinkers

SAP University Alliances

SAP® University Alliances Academic Educational Material Utilization Contract for Teaching Purposes

University Alliances Program Associate Membership

Between

SAP SE
Dietmar-Hopp-Allee 16
69190 Walldorf
Germany

(herein: SAP)

And

IMS Engineering College
Nh-24, adhyatmik Nagar, near Dasna, Ghaziabad
201009 Ghaziabad
India

(herein: Educational Institution)

SAP grants to Educational Institution the right to use SAP University Alliances Academic Educational Material (herein: SAP UA Academic Education Material) for teaching purposes only. SAP will provide access to the required SAP UA Academic Education Material that Educational Institution, as an Associate Member of University Alliances, may use in compliance with the restrictions agreed between SAP and Educational Institution in this contract.

This contract completely replaces all previous UA Academic Education Material utilization contracts that the parties have entered into together and such previous UA Academic Education Material Utilization contracts are of no effect.

Now therefore the parties agree as follows:

Article 1 Object of contract

(1) The object of this contract is the right of Educational Institution, as an Associate Member of University Alliances, to use SAP UA Academic Education Material subject to the provisions of this contract.

(2) SAP will make UA Academic Education Material available for Educational Institution's use through specified distribution channels.

(3) This contract does not include any other goods, works, or services (for example UA Academic Education Material modifications, software licenses, installation, testing, or consulting), but their supply and provision may be agreed in a separate contract subject to SAP's general terms and conditions and list of prices and conditions.

Director
IMS Engineering College

(4) The Educational Institution shall appoint, in writing, a dedicated contact person plus a deputy contact for the collaboration with SAP (name, title, role, postal address, e-mail address).

Article 2 Terms of Educational Institution's utilization of SAP UA Academic Education Material

(1) Educational Institution's permitted use of SAP UA Academic Education Material is restricted to the purposes of teaching of and learning by students of Educational Institution, and internal training for teaching staff. Educational Institution must ensure that only sufficiently qualified teaching staff teach classes relating to SAP UA Academic Education Material.

(2) No use of SAP UA Academic Education Material is permitted for any commercial purpose, including but not limited to use on or to prepare for any consulting project, any development project, any project to train third parties, or any operational application.

(3) For the permitted purposes, Educational Institution is entitled to access to the SAP UA Academic Education Material for an unlimited number of users. Teaching staff are entitled to access SAP UA Academic Education Material from work centers outside of Educational Institution to prepare for their classes. Students are not entitled to access SAP UA Academic Education Material from work centers outside of Educational Institution except during a class using SAP UA Academic Education Material or for the purpose of creating academic works. Educational Institution must take its customary care to ensure that students access SAP UA Academic Education Material from work centers outside of Educational Institution only for the purposes permitted in this contract.

(4) Educational Institution must not permit any third party to use the SAP UA Academic Education Material for any purpose whatsoever. Cooperative use by educational institutions in the SAP UA program is a permitted exception, provided each of the cooperating educational institutions has a license for the UA Academic Education Material used.

(5) Teaching staff at educational institutions that are not members of the SAP UA program are excluded from use of the SAP UA Academic Education Material. Exceptions require SAP UA's written consent. Application should be made to SAP UA in written form.

Article 3 Title and rights

(1) This contract does not assign to Educational Institution any copyright or other title to the SAP UA Academic Education Material by way of patent, trade secret, or otherwise.

(2) Educational Institution, as an Associate Member of University Alliances, is permitted to use the SAP University Alliances Associate Member logo (herein, "UA Associate Member Logo") for the purposes of publications, presentations, own variants of the SAP UA Academic Education Material, web appearances and correspondence. Educational Institution's right to use the UA Associate Member Logo is automatically

terminated if this contract is terminated under article 10 (2, 3). In addition, SAP has discretion to revoke the right of Educational Institution to use the UA Associate Member Logo at any time, by sending a written notice of revocation to Educational Institution. In the event that Educational Institution's right to use the UA Associate Member Logo is revoked, either by contract termination or by written notice being sent, Educational Institution shall apply logo changes or remove the logo from any location where it is being used, within 30 days of the date of the notice of termination or notice of revocation. Educational Institution is not permitted to use or display any other logos of SAP, unless SAP gives its express permission in writing, in advance of any such use or display.

(3) SAP is permitted to use the Educational Institution's name and logo for purposes of the SAP University Alliances Program only, e.g. in the UA Program member list. Any other use requires Educational Institution's written approval in advance. SAP's right to use the Educational Institution's logo is automatically terminated if this contract is terminated under article 10 (2, 3).

Article 4 Terms of Educational Institution's material utilization; Educational Institution's duties

(1) Educational Institution will use the SAP UA Academic Education Material only for the purposes in article 2 (1). Classes may be officially listed in the curriculum with a tax-neutral reference to the relevant SAP UA Academic Education Material.

(2) Educational Institution will record the use of the SAP UA Academic Education Material in conjunction with the corresponding lecture via the technical infrastructure provided by SAP latest at the end of the semester or lecture series where the SAP UA Academic Education Material has been utilized, as long as this doesn't harm the privacy of the users and / or copyrights of the users and / or Educational Institutions.

(3) Educational Institution undertakes to use only the newest SAP UA Academic Education Material version offered via the various, outlined distribution channels.

(4) In the context of its teaching work, Educational Institution may refer to SAP and SAP products. Educational Institution must not remove, alter, or otherwise render unrecognizable any SAP trademark, notably the SAP logo, from or on SAP material or UA Academic Education Material. The SAP trademark license agreement current at the time of contract must be observed.

(5) Educational Institution must at all times have enough nominated qualified contacts who have adequate knowledge to ensure that the educational prerequisites are in place at the Educational Institution for the SAP UA Academic Education Material to be used to proper effect (for example, teaching programs and materials created, student learning supported, service tickets accepted and processed).

Director
IMS Engineering College
Ghaziabad

(6) Educational Institution must ensure that all students and teaching staff using the SAP UA Academic Education Material are notified of the provisions of this contract as necessary.

(7) Educational Institution undertakes to participate in regular surveys conducted by SAP. The purpose of the surveys is the collection of statistics regarding utilization of SAP UA Academic Education Material and shall help to improve the quality of the material and of the supporting processes. In case Educational Institution is not participating in these surveys more than 3 (three) times in a row, SAP shall have the right to terminate the contract according to article 10 (3).

Article 5 Training courses

(1) SAP, at its own discretion, may provide suitable training material, in a form of SAP's choosing (e.g. recorded tutorials, documents or other) for Educational Institution's permanent employees on the SAP UA Academic Education Material covered in this contract.

Article 6 Remuneration

(1) Provided Educational Institution complies with its duties in article 4, no remuneration is payable to SAP in consideration of the SAP UA Academic Education Material utilization.

Article 7 Agreement with SAP UCC – NOT APPLICABLE

Article 8 Hardware; Software; Database management system – NOT APPLICABLE

Article 9 Reviews

(1) SAP UA and Educational Institution may conduct reviews together to improve cooperation. The purpose of the reviews is to assess together the progress of cooperation between Educational Institution and SAP. To this end Educational Institution will prepare a curriculum overview with the following information: user organizations (departments, schools, and so on, of Educational Institution); teaching staff; classes (title, topics, number of teaching units per semester); number of participants in the class. Educational Institution and SAP UA will use the review to determine how their work together should proceed. Educational Institution undertakes to participate in such a review at SAP's request with not less than two months' advance notification.

(2) SAP may request from Educational Institution a curriculum overview as described in article 9 (1). Educational Institution must then provide it to SAP in writing within two months.

Article 10 Delivery date, term, and termination

(1) Educational Institution should agree the delivery date with the appropriate SAP UA representative separately.

Director
IMS Engineering College
Ghaziabad

(2) This contract comes into force when signed and extends for an initial term of 12 months. Thereafter it extends from year to year unless terminated by either of the parties' giving six months' written notice to the other.

(3) In addition to the rights of termination set forth in article 10 (2), this contract may be terminated immediately by either party for cause upon the event that the other party commits a breach of any of its material obligations under this contract and fails to cure such breach within thirty (30) calendar days after written notice thereof from the non-breaching party, or commits a material breach which is incapable of cure.

(4) From the time termination notice takes effect, Educational Institution is not entitled to offer classes or other services relating to the SAP UA Academic Education Material for the next semester. Educational Institution is entitled to continue to their conclusion on the terms of this license classes running at the time of termination notice and examinations relating to them.

(5) Termination notice must be in written form.

(6) At the end of the contract validity, Educational Institution must return all delivered goods and copies of SAP UA Academic Education Material received from SAP.

Article 11 Warranty

(1) SAP will not provide any warranty service.

Article 12 Maintenance

(1) Contrary provisions in the GTC, section 10, notwithstanding, SAP will not provide any maintenance service under this contract.

(2) This contract does not give Educational Institution any right to updates of the SAP UA Academic Education Material to be created and published by SAP UA. Educational Institution is free to request such an update, and SAP has the discretion to approve or deny such requests. Where SAP agrees or otherwise chooses to develop an update to SAP UA Academic Education Material, SAP will be the sole developer of said update and will be the sole and exclusive owner of all updated material and all interim drafts, final versions and other work product developed as part of the update process.

Article 13 Liability

(1) The Educational Institution has the sole responsibility for material modifications and variants created by the Educational Institution in courses, and SAP herewith excludes any liability and warranty in connection with the Educational Institution's modifications and variants of the UA Academic Education Material. Educational Institution shall communicate problems to SAP precisely and comprehensibly.

(2) Other than that, SAP nor the university is liable except in cases of intent or gross negligence. This does not affect liability in product liability law.

Article 14 Terms and conditions

(1) In the event of any conflict between the English and other language versions, the English version shall prevail.

Educational Institution

Ghaziabad

(Place)

6/9/2017

(Date)

(Signature)

Director
IMS Engineering College
Ghaziabad

Signee Name:

Signee Title:

SAP SE

Walldorf, 06.09.2017

(Place, date)

SAP SE
Dietmar-Hopp-Allee 16
D - 69190 Walldorf
Telefon: +49 6227 7-47474
Fax: +49 6227 7-57575

ppa. Dr. Bernd Welz
Chief Knowledge Officer
Products & Innovation
SAP SE

i.V. Dr. Michael Nuernberg
Regional Director SAP University
Alliances and SAP Next-Gen DACH
SAP SE

Trinity Mobile App Lab Pvt Ltd

Memorandum of Understanding

Between

(IMS Engineering College, Ghaziabad)

And

(Trinity Mobile App Lab Pvt.Ltd)

This Memorandum of Understanding (herein after referred to as MoU) is entered into on the 2nd day of Jan, 2019 by and between Computer Science & Engineering , under (IMS Engineering College), (Ghaziabad) herein referred to as IMSEC, and Monteage Services located at Trinity Mobile App Lab Pvt ltd.

As a part of the agreement, Trinity Mobile App Lab Pvt ltd will extend opportunities to selected students to work on innovative mobile app based projects with commercial aspect. **Trinity Mobile App Lab Pvt ltd** will extend this opportunity for the students as a under social responsibility towards society

Trinity Mobile App Lab Pvt is also keen to establish an off-shore software development Centre under the name "**Trinity Mobile App-Development Extension Center**" at IMS Engineering College campus.

Objectives & Functional Responsibilities

1. Students will be given regular opportunities to work on smart & innovative mobile applications with commercial aspect.
2. Students will be treated as project interns during the making of the project.
3. Students will also receive work experience letter from Trinity & appreciation letter from the department
4. The company will associate one employee as team leader with each student group working on a project.
5. The project coordinator will avail all the technical specifications & associated documents to each team member.

Trinity Mobile App Lab Pvt Ltd

Period of Validity

This agreement shall be initially valid for one year from the date of signing the agreement and to be renewed subsequently by mutual consent of both the parties.

Following projects have been identified & allocated to student groups for the session 2018-19

1	Map view dashboard
2	Project Governance
3	Field force automation
4	Smart City
5	Visitor Management System
6	Survey Management System

On behalf of

IMS Engineering College

on behalf of

Trinity Mobile App Lab Pvt ltd

For Trinity Mobile App Lab Private Limited

Authorised Signatory

NATIONAL BOARD OF ACCREDITATION

NBCC Place, East Tower, 4th Floor, Bhisham Pitamah Marg,
Pragati Vihar, New Delhi-110 003
Tel: +91 11 2436 0620-22, 2436 0654 Telefax: +91 11 2436 0682
Website: www.nbaind.org

NATIONAL BOARD of ACCREDITATION

File No: 35-113/2015-NBA **Date : 23-03-2017**

To,

The Director,
IMS Engineering College,
Nh-24, Adhyatmik Nagar,
Ghaziabad - 201009 (UP).

Subject: Extension of the period of Accreditation status granted to UG Engineering programs offered by IMS Engineering College, NH-24, Adhyatmik Nagar, Ghaziabad, Uttar Pradesh.

Sir,

This has reference to NBA's letter of even number dated 26-10-2016 under which some of the UG Engineering programs offered by your Institution were granted accreditation in Tier II by National Board of Accreditation.

2. National Board of Accreditation (NBA) has decided that in all cases where UG Engineering programs of an Institution were granted provisional accreditation for a period of 2 years in Tier I/Tier II format, the period of provisional accreditation of these programs shall be extended from 2 to 3 years subject to the condition that they meet the essential Pre-visit qualifiers. The Pre-visit qualifiers submitted by IMS Engineering College, NH-24, Adhyatmik Nagar, Ghaziabad, Uttar Pradesh have been considered and approved by NBA in respect of the following UG Engineering programs. Accordingly, the competent authority in NBA has approved the following accreditation status to the programs as given in the Table below:

Sl. No.	Name of the Program (UG)	Basis of Evaluation	Accreditation Status	Period of extended validity	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
1.	Computer Science and Engineering	Tier- II document	Provisionally accredited	Academic Year 2018-19, i.e., upto 30.06.2019	Accreditation status granted is valid for the period indicated in col.5 or till the program has the approval of the competent authority, whichever is earlier
2.	Mechanical Engineering	Tier- II document	Provisionally accredited		

3. It may be noted that only students who graduate during the validity period of accreditation, will be deemed to have graduated with an NBA accredited degree.

4. The programs have been granted provisional accreditation. IMS Engineering College, NH-24, Adhyatmik Nagar, Ghaziabad, Uttar Pradesh should submit the Compliance Report at least six months before the expiry of validity of accreditation mentioned above to be eligible to be considered by the concerned Committee in NBA for further processing of the accreditation status. This could entail further extension of accreditation or a revisit, as deemed appropriate by NBA Committees.

Contd..2/-

5. The accreditation status awarded to the programs as indicated in the above table does not imply that the accreditation has been granted to IMS Engineering College, NH-24, Adhyatmik Nagar, Ghaziabad, Uttar Pradesh as a whole. As such the Institution should nowhere along with its name, including on its letter head etc. write that it is accredited by NBA because NBA only accredits programs, and not Institutions. If such an instance comes to NBA's notice, this will be viewed seriously. Complete name of the programs accredited, level of programs and the period of validity of accreditation, should be mentioned unambiguously whenever and wherever it is required to indicate the status of accreditation by NBA.

6. The accreditation status of the above programs is subject to change on periodic review, as deemed necessary by the NBA. It is desired that the relevant information in respect of accredited programs as indicated in the Table in paragraph 2, appears on the website and information bulletin of your College/Institution.

7. The accreditation status awarded to the programs as indicated in Table in paragraph 2 above is subject to maintenance of the current standards during the period of accreditation. If there are any changes in the status (major changes of faculty strength, organizational structure etc.), the same are required to be communicated to the NBA, with an appropriate explanatory note. .

Yours faithfully,

(Dr. Anil Kumar Nassa)
Member Secretary

Copy to:

1. The Director,
   Technical Education,
   Vikas Nagar, Kanpur - 208 024.

2. Master Accreditation Folder of the State.

NATIONAL BOARD OF ACCREDITATION

NBCC Place, East Tower, 4th Floor, Bhisham Pitamah Marg,
Pragati Vihar, New Delhi-110 003
Tel: +91 11 2436 0620-22, 2436 0654 ; Telefax: +91 11 4308 4903
Website: www.nbaind.org

NATIONAL BOARD of ACCREDITATION

File No: 35-113/2015-NBA **Dated: 19-03-2019**

To
The Director
IMS Engineering College,
NH-24, Adhyatmik Nagar,
Ghaziabad- 201 009,
Uttar Pradesh

Subject: Accreditation status of program applied by IMS Engineering College, NH-24, Adhyatmik Nagar, Ghaziabad- 201 009, Uttar Pradesh.

Sir,

This has reference to your application I.D. No. 2549-11/09/2017 seeking accreditation by National Board of Accreditation in Tier-II format to UG Engineering program offered by **IMS Engineering College, NH-24, Adhyatmik Nagar, Ghaziabad- 201 009, Uttar Pradesh.**

2. An Expert Team conducted on-site evaluation of the program from **3rd to 4th November, 2018.** The report submitted by the Expert Team was considered by the concerned Committees constituted for the purpose in NBA. The competent authority in NBA has approved the following accreditation status to the program as given in the table below:

Sl. No.	Name of the Program (UG)	Basis of Evaluation	Accreditation Status	Period of validity	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
1.	Biotechnology	Tier-II	Accredited	Academic Years 2018-2019 to 2020-2021 i.e. upto 30-06-2021	Accreditation status granted is valid for the period indicated in Col.5 or till the program has the approval of the competent authority, whichever is earlier

3. It may be noted that only students who graduate during the validity period of accreditation, will be deemed to have graduated with an NBA accredited degree.

4. The program has been granted accreditation for three years. **IMS Engineering College, NH-24, Adhyatmik Nagar, Ghaziabad- 201 009, Uttar Pradesh** should submit the Compliance Report at least six months before the expiry of validity of accreditation mentioned above to be eligible for consideration by the concerned Committee in NBA for further processing of the accreditation status. This could entail further extension of accreditation or a revisit, as deemed appropriate by NBA Committees.

5. The accreditation status awarded to the program as indicated in the above table does not imply that the accreditation has been granted to **IMS Engineering College, NH-24, Adhyatmik Nagar, Ghaziabad- 201 009, Uttar Pradesh** as a whole. **As such the Institution should nowhere along with its name including on its letter head etc. write that it is accredited by NBA because it is program accreditation and not Institution accreditation. If such an instance comes to NBA's notice, this will be viewed seriously.** Complete name of the program(s) accredited, level of program(s) and the period of validity of accreditation, as well as the Academic Year from which the accreditation is effective should be mentioned unambiguously whenever and wherever it is required to indicate the status of accreditation by NBA.

Contd/...

6. The accreditation status of the above program is subject to change on periodic review, if needed by the NBA. It is desired that the relevant information in respect of accredited program as indicated in the table in paragraph 2, appears on the website and information bulletin of the Institute.

7. The accreditation status awarded to the program as indicated in table in paragraph 2 above is subject to maintenance of the current standards during the period of accreditation. If there are any changes in the status (major changes of faculty strength, organizational structure etc.), the same are required to be communicated to the NBA, with an appropriate explanatory note.

8. A copy each of the Report of Chairman of the Visiting Team and Evaluators' Report in respect of the above program is enclosed.

9. If the Institute is not satisfied with the decision of NBA, it may appeal within thirty days of receipt of this communication giving reasons for the same and by paying the requisite fee.

Yours faithfully,

(Dr. Anil Kumar Nassa)
Member Secretary

Encls: 1.Copy of Report of Chairman of the Visiting Team.
2. Copy of Expert Report of the Visiting Team.

Copy to:

1. The Registrar
APJ Abdul Kalam Technical University,
Sec-11, Jankipuram, Vistar Yojna,
Lucknow- 226 031
Uttar Pradesh

2. Director Technical Education
Govt. of Uttar Pradesh
Vikas Nagar, Kanpur- 208 024
Uttar Pradesh

3. Accreditation File

4. Master Accreditation file of the State.

COURSE FILE

OF

Integrated Circuits

(KEC 501)

2020-2021

DEPARTMENT OF

ELECTRONICS & COMMUNICATION

ENGINEERING

IMS ENGINEERING COLLEGE, GHAZIABAD

Faculty Name: Praveen Kumar

Branch: Electronics and Communication *Engineering*

Semester: 5th

Session: 2020-21

Subject Name: Integrated Circuits

Subject Code: KEC 501

IMS ENGINEERING COLLEGE	IMSEC/QF/42
FORMATS	Page 1 of 1 Issue No: 02
Course File Cover Page	Issue Date: 1 May 2010
Prepared by: MR	Approved by: Director

	Particulars
1.	Quality Policy (on left inside cover of Course File)
2.	Institute Mission and Vision
3.	Departmental Mission and Vision
5.	Program Outcomes (PO)
6.	Program Educational Objectives (PEO) and Program Specific Outcomes (PSO)
7.	Academic Calendar
8	Time Table
9	Student List
10.	University Evaluation Scheme
11.	Syllabus (Theory)
12.	Course Outcome, Mapping with PO/PSO
13.	Syllabus (Practical) with Experiment List mapped with Course Outcomes
14.	Topics beyond Syllabus
15.	Quiz/Assignment/Tutorial Records
16.	CT Question Paper (mapped with CO)
17.	Sessional Marks Analysis
18.	Lecture Notes/PPT
19.	Question Bank
20	Last three years University Question Paper (AKTU) with Solution
21	Attendance Register

Name and Signature of Course Instructor	Signature of HoD
Pravin Kr Kumar	

Space for Internal Auditor's Use

IMSEC, GHAZIABAD

Department of Electronics and Communication Engineering

Vision of the Institution

Our vision is to impart vibrant, innovative and global education to make IMS the world leader in terms of excellence of education, research and to serve the nation in the 21st century.

Mission of the Institution:

- To develop IMSEC as a centre of Excellence in Technical and Management education.
- To inculcate in its students the qualities of Leadership, Professionalism, Executive competence and corporate understanding.
- To imbibe and enhance Human Values, Ethics and Morals in our students.
- To transform students into Globally Competitive professionals.

Vision (Department):

To produce highly competent engineers by imparting innovative and accomplished information through global education and adequately prepare them to face the challenges of outside world by fulfilling the requirements of Electronics & Communication industries.

Mission (Department):

- To make the department a centre of excellence in Electronics & Communication Engineering and to produce eminent engineers.
- To inculcate professionalism, team work, leadership qualities by imbibing high human values and professional ethics, in students.
- To enhance the employability of students by giving inter-disciplinary knowledge to meet the need of society and become globally competitive professionals.
- To become a centre for research in the stream of Electronics & Communication Engineering and to provide excellent learning environment for researchers by promoting research activities in the department.

IMSEC, GHAZIABAD

Department of Electronics and Communication Engineering

PROGRAM OUTCOMES (POs)

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems.
2. **Problems analysis:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design development and solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety and cultural, societal and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources and modern engineering IT tools, including prediction and limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development.
8. **Ethics:** Apply ethical principles, commit to professional ethics, responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, as a member or leader in diverse teams and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with the society at large. To be able to comprehend and write effective reports, design documentation, make presentations, give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge, understanding of the engineering and management principles. Apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for and have the preparation, ability to engage in independent and life-long learning in the broadest context of technological change.

IMSEC, GHAZIABAD

Department of Electronics and Communication Engineering

Program Educational Objectives (PEOs)

PEO1: Graduates will excel in Electronics & Communication Engineering, both in industrial and academic sector by applying their technical skills and knowledge in a professional manner.

PEO2: Graduates will be capable of effectively analyzing and solving engineering problems utilizing appropriate techniques and advanced engineering tools.

PEO3: Graduates will be capable of applying their knowledge both in individual and multidisciplinary environments. They will also demonstrate excellent communication skills and caliber to work as a team.

PEO4: Graduates will realize the significance of environmental concerns while keeping safety, ethical and societal values into consideration.

PEO5: Graduates will be capable of implementing outputs derived from research based knowledge in projects, analysis and interpretation of data leading to development of new processes and systems.

IMSEC, GHAZIABAD

Department of Electronics and Communication Engineering

PROGRAM SPECIFIC OUTCOMES (PSOs)

At the end of the program, the students will have:

1. An ability to exhibit knowledge acquired from mathematics, engineering fundamentals, Electronics & Communication engineering and related fields for professional excellence in industry and research organizations.
2. An ability to solve and communicate complex Electronics and Communication Engineering problems, using latest hardware and software tools, along with analytical skills to arrive at cost effective and appropriate solutions.
3. Wisdom of social and environmental awareness along with ethical responsibility to have a successful career and to sustain passion and zeal for real-world applications using optimal resources as an Entrepreneur.
4. An ability to select appropriate techniques , resources for execution of projects and function effectively as an individual as well as a team member in multidisciplinary diverse environments.

IMS ENGINEERING COLLEGE, GHAZIABAD
ACADEMIC CALENDAR (As per AKTU) (ODD SEM: 2020 - 21) [Version-1]

Oct-20

M	T	W	T	F	S	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

T/ W Days : 19/21

Nov-20

M	T	W	T	F	S	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

T/ W Days : (16+3)/20

Dec-20

M	T	W	T	F	S	
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

T/ W Days : 17/24

Jan-21

M	T	W	T	F	S	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

T/ W Days : 15/22

Feb-21

M	T	W	T	F	S	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28

T/ W Days : 20/22

Mar-21

M	T	W	T	F	S	
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

T/ W Days : 5/23

IMPORTANT DATES	HOLIDAYS	EXAMINATION / CLASS TEST
Commencement of Classes for 2nd, 3rd & 4th Yr: 5th Aug	14, 15 & 16 NOV (SAT, SUN & MON): Deepawali	CT-1 : 2nd-DEC to 8th DEC, 2020
Commencement of Classes for 1st & 2nd (Lateral) 25th NOV	30-NOV (MON) : Guru Nanak's B'day	CT-2 : 19, 21, 26, 28-DEC, 2, 4 JAN 2021
	25-DEC (FRI) : Christmas Day	PUT : 18th JAN to 23rd JAN, 2021
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Upload Assignment (Important Dates)	28-MAR (SUN) : Holika Dahen	AKTU End Sem Exam (01-FEB to 20-FEB, 2021)
	29-MAR (MON) : Holi	(1st & 2nd Year AKTU External)
		AKTU End Sem Exam (08-MAR to 20-MAR, 2021)
		AKTU End Sem Practical Examination

Total Teaching Days/Working Days (T/W) : 60/132 [95/132]

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2) Upload / Check / Submit the assignment as per schedule (weekly).

IMS ENGINEERING COLLEGE	IMSEC/QF/08b
FORMAT	Page 1 of 1
	Issue No: 01
Time Table	Issue Date: 1 May 2010
Prepared by:	Approved by: Director

CLASS TT EC-2 4th YEAR (C-306)

Academic Session2020-21(ODD)

DAY/TIME	Period-1	Period-2	Period-3	Period-4	Break	Period-5	Period-6
	9:00-9:50	10:00-10:50	11:00-11:50	12:00-12:50	12:50-2:00 PM	2:00-2:50 PM	3:00-3:50 PM
MON			KEC 301			Electronics Devices Lab	
TUE	KEC 301	KEC 301				Integrated Circuits Lab	
WED			KEC-501				
THU		KEC 301				KEC-501	
FRI	KEC-501			KEC-501			
SAT							

CODE	Subject	FACULTY	Code	Lab Name	
KEC-501	Integrated Circuits	PROF PRAVEEN KUMAR	KEC 351	Electronics Devices Lab	
KEC-301	Electronic Devices	PROF PRAVEEN KUMAR	KEC-551	Integrated Circuits Lab	

IMS ENGINEERING COLLEGE GHAZIABAD

ELECTRONICS & COMMUNICATION ENGINEERING DEPARTMENT

EC 3rd year

S.No.	Roll No.	Name	Student No.	Father No.
1	1714331042	RAHUL SINGH	8512846443	
2	1814331002	AASHI SINGH	9760844799	7253090799
3	1814331004	ABHISHEK KANDPAL	8929297923	9810334103
4	1814331003	ABHISHEK KUMAR	7352133304	9348555526
5	1814331005	ADITYA KUMAR	7524056794	9598271523
6	1814331006	ADITYA PANDEY	9628647442	9005808762
7	1814331007	AKHIL RUHELA	7838954908	9953004133
8	1814331008	AKSHAY VERMA	7017889514	9410267058
9	1814331009	ALI MAJAZ	8191919749	9634371978
10	1814331010	AMAN SAIFI	9897940786	9897940786
11	1814331011	ANIRUDH MANOJ	8006060404	8006060404
12	1814331012	ANMOL SHARMA	8588861488	9871589567
13	1814331013	ANSHUL SHARMA	9899062918	7428572447
14	1814331014	ANTRIKSH SAXENA	8057290569	9639971946
15	1814331015	ANUBHAV SINGH	9536712418	6396061138
16	1814331016	ARBAZ AKHTAR	7905325543	9540080461
17	1814331028	ARMAN SHAH	9910636028	9958139757
18	1814331017	ARPIT SONI	7607524723	8423002715
19	1814331018	ASHISH CHAUDHARY	7453039250	9719057509
20	1814331019	ASHISH SHARMA	9105212161	9927365600
21	1814331020	AYUSH SAINI	7060050264	9368007688
22	1814331021	HARDIK RASTOGI	8265983373	9837048602
23	1814331022	HARSH JAISWAL	7651966994	9450630124
24	1814331023	JATIN AGARWAL	8171008360	9897046135
25	1814331024	JATIN RANA	9311663355	9871023868
26	1814331025	JAYA SINHA	9354773714	8966841558
27	1814331026	KRITIKA NATH	7530845511	9971381759
28	1814331032	MANIK CHOUDHARY	8082640017	9055072582
29	1814331027	MANSI SAXENA	9794790063	9044879071
30	1814331029	MUDIT PRATAP SINGH	9415998182	9451466553

31	1814331030	MUKUL CHAUHAN	8859977600	8859977600
32	1814331031	MUNESH KUMAR SINGH	7007912346	9952709172
33	1814331033	NIKHIL KUMAR	8192828586	9410653845
34	1814331034	NISHA .	9821151993	9716598366
35	1814331035	NITESH UPADHYAY	8006041323	8006041323
36	1814331036	PRABHAT MITTAL	9457625151	9410224751
37	1814331037	PRADEEP DUBEY	9598900234	7532989975
38	1814331038	PRAKHAR TRIVEDI	9554604065	9415474508
39	1814331039	RACHIT GARG	9717182905	9667223326
40	1814331040	RISHABH GUPTA	7081168512	9026374265
41	1814331041	RIYA AGARWAL	9412659808	9837654012
42	1814331042	SAKSHI VARSHNEY	7455007178	9058464594
43	1814331043	SARANSH RAI	9682290100	9532706590
44	1814331044	SARTHAK GUPTA	9784546866	9887859633
45	1814331045	SAURABH GUPTA	8382814157	9984160785
46	1814331046	SHASHWAT DWIVEDI	9161133639	9090973080
47	1814331047	SHELENDRA RAGHAV	9868937012	8130603668
48	1814331048	SHIVAM KATIYAR	9354483513	9654958542
49	1814331049	SHIVANGI MISHRA	9532215002	8800108462
50	1814331050	SUPREET DEOL	8160586479	9927647574
51	1814331051	TANISH VARSHNEY	7906229438	9219758815
52	1814331052	TANISHKA VATS	8810335918	9599612689
53	1814331053	TUSHAR KUMAR	7906365288	7060153909
54	1814331054	UTKARSH SINGH	6351611541	7228888653
55	1814331055	VED PRAKASH SHARMA	9472207260	9631623631
56	1814331056	VISHAL RANA	7839801507	8650664356
57	1814331057	YASH DIXIT	8279724868	9917022660
58	1814331058	YASHASVI SINGH	9956441270	9918164501

B.Tech. V Semester
Electronics and Communication Engineering

S. No.	Course Code	Course Title	Periods			Evaluation Scheme				End Semester		Total	Credits
			L	T	P	CT	TA	Total	PS	TE	PE		
1	KEC-501	Integrated Circuits	3	1	0	30	20	50		100		150	4
2	KEC-502	Microprocessor & Microcontroller	3	1	0	30	20	50		100		150	4
3	KEC-503	Digital Signal Processing	3	1	0	30	20	50		100		150	4
4	KEC-051-054	Department Elective-I	3	0	0	30	20	50		100		150	3
5	KEC-055-058	Department Elective-II	3	0	0	30	20	50		100		150	3
6	KEC-551	Integrated Circuits Lab	0	0	2				25		25	50	1
7	KEC-552	Microprocessor & Microcontroller Lab	0	0	2				25		25	50	1
8	KEC-553	Digital Signal Processing Lab	0	0	2				25		25	50	1
9	KEC-554	Mini Project/Internship **	0	0	2				50			50	1
10	KNC501/KNC502	Constitution of India, Law and Engineering / Indian Tradition, Culture and Society	2	0	0	15	10	25		50			NC
11		MOOCs (Essential for Hons. Degree)											
		Total										**950**	**22**

**The Mini Project or Internship (4weeks) conducted during summer break after IV Semester and will be assessed during Vth Semester.

Course Code	Course Title
	Department Elective-I
KEC-051	Computer Architecture and Organization
KEC-052	Industrial Electronics
KEC-053	VLSI Technology
KEC-054	Advance Digital Design using Verilog
	Department Elective-II
KEC-055	Electronics Switching
KEC-056	Advance Semiconductor Device
KEC-057	Electronics Measurement & Instrumentation
KEC-058	Optical Communication

KEC-501	INTEGRATED CIRCUITS	3L:1T:0P	4 Credits

Unit	Topics	Lectures
I	**The 741 IC Op-Amp**: General operational amplifier stages (bias circuit, the input stage, the second stage, the output stage, short circuit protection circuitry), device parameters, DC and AC analysis of input stage, second stage and output stage, gain, frequency response of 741, a simplified model, slew rate, relationship between ft and slew rate.	8
II	**Linear Applications of IC Op-Amps:** Op-Amp based V-I and I-V converters, instrumentation amplifier, generalized impedance converter, simulation of inductors. **Active Analog filters:** Sallen Key second order filter, Designing of second order low pass and high pass Butterworth filter, Introduction to band pass and band stop filter, all pass active filters, KHN Filters. Introduction to design of higher order filters.	8
III	**Frequency Compensation & Nonlinearity:** Frequency Compensation, Compensation of two stage Op-Amps, Slewing in two stage Op-Amp. Nonlinearity of Differential Circuits, Effect of Negative feedback on Nonlinearity. **Non-Linear Applications of IC Op-Amps:** Basic Log–Anti Log amplifiers using diode and BJT, temperature compensated Log-Anti Log amplifiers using diode, peak detectors, sample and hold circuits. Op-amp as a comparator and zero crossing detector, astable multivibrator & monostable multivibrator. Generation of triangular waveforms, analog multipliers and their applications.	4 8
IV	**Digital Integrated Circuit Design:** An overview, CMOS logic gate circuits basic structure, CMOS realization of inverters, AND, OR, NAND and NOR gates. **Latches and Flip flops**: the latch, CMOS implementation of SR flip-flops, a simpler CMOS implementation of the clocked SR flip-flop, CMOS implementation of J-K flip-flops, D flip- flop circuits.	6
V	**Integrated Circuit Timer:** Timer IC 555 pin and functional block diagram, Monostable and Astable multivibrator using the 555 IC. Voltage Controlled Oscillator: VCO IC 566 pin and functional block diagram and applications. **Phase Locked Loop (PLL)**: Basic principle of PLL, block diagram, working, Ex-OR gates and multipliers as phase detectors, applications of PLL.	6

Text Book:

1. Microelectronic Circuits, Sedra and Smith, 7th Edition, Oxford, 2017.
2. Behzad Razavi: Design of Analog CMOS Integrated Circuits, TMH

Reference Books:

1. Gayakwad: Op-Amps and Linear Integrated Circuits, 4th Edition Prentice Hall of India, 2002.
2. Franco, Analog Circuit Design: Discrete & Integrated, TMH, 1st Edition.
3. Salivahnan, Electronics Devices and Circuits, TMH, 3rd Edition, 2015
4. Millman and Halkias: Integrated Electronics, TMH, 2nd Edition, 2010

Course Outcomes: At the end of this course students will demonstrate the ability to:

1. Explain complete internal analysis of Op-Amp 741-IC.
2. Examine and design Op-Amp based circuits and basic components of ICs such as various types of filter.
3. Implement the concept of Op-Amp to design Op-Amp based non-linear applications and wave-shaping circuits.
4. Analyse and design basic digital IC circuits using CMOS technology.
5. Describe the functioning of application specific ICs such as 555 timer ,VCO IC 566 and PLL.

IMSENGINEERINGCOLLEGE	IMSEC/QF/42
FORMATS	Page1of1 IssueNo:02
CourseFileCoverPage	IssueDate:1May2010
Preparedby:MR	Approvedby:Director

	Particulars
1.	QualityPolicy(onleft inside coverof Course File)
2.	Institute Mission and Vision
3.	Departmental Mission and Vision
5.	Program Outcomes (PO)
6.	Program Educational Objectives (PEO) and Program Specific Outcomes (PSO)
7.	Academic Calendar
8	Time Table
9	Student List
10.	University Evaluation Scheme
11.	Syllabus (Theory)
12.	Course Outcome, Mapping with PO/PSO
13.	Syllabus (Practical) with Experiment List mapped with Course Outcomes
14.	Topics beyond Syllabus
15.	Quiz/Assignment/Tutorial Records
16.	CT Question Paper (mapped with CO)
17.	Sessional Marks Analysis
18.	Lecture Notes/PPT
19.	Question Bank
20	Last three years University Question Paper (AKTU) with Solution
21	Attendance Register

NameandSignatureofCourseInstructor	SignatureofHoD
(VARUN KUMAR SINGHAL) (V.V)	
	Space for Internal Auditor's Use

IMS ENGINEERING COLLEGE GHAZIABAD

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

VISION OF INSTITUTE

Our vision is to impart Vibrant, Innovative and Global Education to make IMS the world leader in terms of Excellence of Education, Research and to serve the nation in the 21st century

MISSION OF INSTITUTE

- To develop IMSEC as a centre of excellence in technical and management education.
- To inculcate in its students, the qualities of leadership, professionalism, corporate understanding & executive competence.
- To imbibe & enhance human values, ethics & morals in our students.
- To transform students into globally competent professionals.

VISION OF DEPARTMENT

Vision of Electrical and Electronics Engineering Department is to produce a dynamic, creative, technically sound and globally competitive engineer that can face the challenges of modern industry and serve the society at a global level.

MISSION OF DEPARTMENT

1. To provide the students globally accepted technical education in electrical and electronics engineering for making them technically skilled and motivated professionals in order to comply the needs of Society and modern Industries.
2. To provide research oriented atmosphere among the students so that they imply their thoughts and knowledge in implementing live industrial projects.
3. Emphasis on creation of excellence in applications through knowledge sharing, value addition programmes, beyond syllabus programmes, industry-academia interaction, interdisciplinary research and personality development programmes.
4. To encourage faculties and students for higher studies and research for knowledge enhancement and hence become successful professionals in the society.

IMS ENGINEERING COLLEGE GHAZIABAD

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

PROGRAMME OUTCOMES (POs)

Program Outcomes (POs)	Domain	Statement
PO1	Engineering knowledge	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem analysis	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/ development of solutions	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex problems	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern tool usage	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	The engineer and society	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and sustainability	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and team work	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project management and finance	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-long learning	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

IMS ENGINEERING COLLEGE GHAZIABAD

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

The major program education objectives of the B.Tech. programme in Electrical and Electronics Engineering are:

a. To produce proficient electrical and electronics engineering graduates with a strong foundation in design analytics and problem solving skills for successful professional careers in industry, research and public service.

b. To prepare the students to excel for self and societal development through higher studies and research activites.

c. To inculcate in students excellent professionalism, ethical attitude, effective communication skills, teamwork skills, multidisciplinary approach and an ability to relate engineering issues to broader social context.

d. To provide students with an academic environment aware of excellence and the life-long learning needed for a successful professional career as an engineer, scientist, technocrat, administrator and an entrepreneur.

e. To train students with advance technical skills so as to comprehend, analyze, design and create innovative products and solutions for the real life problems.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

Program Specific Outcomes(PSOs)	Statement
PSO 1	Graduates shall have an ability to apply fundamental knowledge of mathematics, applied science, engineering and management for the solution of electrical engineering problems.
PSO 2	Graduates will be able to analyse and conduct investigations on complex engineering activities to arrive at valid conclusions.
PSO 3	Graduates shall have an ability to apply learned principles to the design, analysis, development and implementation of advanced electrical systems.

IMS ENGINEERING COLLEGE, GHAZIABAD

ACADEMIC CALENDAR (As per AKTU) (ODD SEM: 2020 - 21) [Version-1]

Oct-20

M	T	W	T	F	S	S
			1		3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22			25
26	27	28		30	31	

T/ W Days : 19/21

Nov-20

M	T	W	T	F	S	S
						1
2	3	4	5	6	7	8
9	10	11	12	13		15
	17	18	19	20	21	22
23	24	25	26	27	28	29

T/ W Days : (16+3)/20

Dec-20

M	T	W	T	F	S	
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24		26	27
28	29	30	31			

T/ W Days : 17/24

Jan-21

M	T	W	T	F	S	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25		27	28	29	30	31

T/ W Days : 15/22

Feb-21

M	T	W	T	F	S	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28

T/ W Days : 20/22

Mar-21

M	T	W	T	F	S	S
1	2	3	4	5	6	7
8	9	10		12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
	30	31				

T/ W Days : 5/23

IMPORTANT DATES	HOLIDAYS	EXAMINATION / CLASS TEST
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		AKTU End Sem Exam (08-MAR to 20-MAR, 2021)
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IMS ENGINEERING COLLEGE	IMSEC/QF/08b
FORMATS	Page 1 of 1
	Issue No: 02
Faculty Time Table	Issue Date: 1 May 2010
Prepared by: MR	Approved by: Director

TIME TABLE

Academic Session: 2020-2021 **Name of Faculty : Mr. Varun Singhal** **Branch: EN** **W.E.F. 18-01-2021**

	1 9:00 - 9:50	2 10:00 - 10:50	3 11:00 - 11:50	4 12:00 - 12:50	5 12:50 - 14:00	6 14:00 - 14:50	7 15:00 - 15:50
Mo		KEE-052(L) EN C-409	REE-702(L) EN C-410				
Tu						REN-752(P) VS / DT EN C-407(B)	
We		KEE-052(L) EN C-409				REN-752(P) VS / SB EN	
Th			REE-702(L) EN C-410	KEE-052(L) EN C-409		KEE-354(P) VS EN	
Fr				REE-702(L) EN C-410			

Subject	Subject - Code	Section	Subject	Subject - Code	Section
Electrical Measuremet and Instru.	KEE-302(L)	EN	Sensors and Transducers	KEE-052(L)	EN
EMI LAB	KEE-352(P)	EN	Power System Protection	REE-702(L)	EN
Mini Project or Internship Assessmen	KEE-354(P)	EN	Power System Lab	REN-752(P)	EN

Mr. Saroj Kumar
Time Table Incharge

18/01/21
Mr. Vijay Kumar
HOD EN

IMS ENGINEERING COLLEGE	IMSEC/QF/08b
FORMAT	Page 1 of 1
	Issue No: 01
Class Time Table	Issue Date: 1 May 2010
Prepared by:	Approved by: Director

Class Time Table (Coordinator: Mr. Varun Kumar Singhal)

Academic Session 2020-21(ODD) B.Tech 2nd Yr, Branch - EN, Room No. 310, C-BLOCK

DAY/TIME	Period-1	Period-2	Period-3	BREAK	Period-4	
	9.30AM-10.30 AM	10:45 AM-11:45 AM	12:00 AM -01:00 PM	01:00 PM - 2 PM	2 PM -3 PM	
MON	KEE301(Electromagnetic Field Theory) Mr. Sameer Anand	KEE303(Basic Signals & Systems) Mr. Saroj Kumar	KAS302(Maths IV) Mr. Pravesh (EC+EN)			
TUE	KEE302 (Electrical Measurements & Instrumentation) Mr. Varun Kumar Singhal	KEE301(Electromagnetic Field Theory) Mr. Sameer Anand	KAS302(Maths IV) Mr. Pravesh (EC+EN)			
WED	KAS301(Technical Communications) Dr. Renuka (EC+EN)	KEE303(Basic Signals & Systems) Mr. Saroj Kumar	KAS302(Maths IV) Mr. Pravesh (EC+EN)			
THU	KEE303(Basic Signals & Systems) Mr. Saroj Kumar	KEE302 (Electrical Measurements & Instrumentation) Mr. Varun Kumar Singhal	KAS302(Maths IV) Mr. Pravesh (EC+EN)			
FRI	KEE302 (Electrical Measurements & Instrumentation) Mr. Varun Kumar Singhal	KAS301(Technical Communications) Dr. Renuka (EC+EN)	KEE301(Electromagnetic Field Theory) Mr. Sameer Anand			
SAT						

HOD-EN

IMS ENGINEERING COLLEGE	IMSEC/QF/43
FORMATS	Page 1 of 3
	Issue No: 02
Student List	Issue Date: 1 May 2010
Prepared by: MR	Approved by: Director

EN 2nd Year

S.No	College Id	Roll No	Name	Student Contact no.	Parents Contact no.
1	A2019EN6400	1901430210001	ABHISHEK TOMER	7533950768	9927584798
2	A2019EN6756	1901430210002	AKASH SINGH	8882072818	9454001999
3	A2019EN6397	1901430210003	ALOK SRIVASTAVA	7985749384	9670552962
4	A2019EN6646	1901430210004	AMIT KUMAR DITHONIYA	9897292840	7520767661
5	A2019EN6971	1901430210006	DEEPAK SAHU	6386787871	9721083702
6	A2019EN6375	1901430210007	DIVYANSH ARYA	9910595014	7065777328
7	A2019EN6384	1901430210009	PRANJAL SINGH CHAUHAN	9528164958	9536018340
8	A2019EN6360	1901430210010	PRASHANT CHAUDHARY	7983397454	9759438182
9	A2019EN6953	1901430210011	PRATEEK CHAUDHARY	9625373882	9717639273
10	A2019EN6364	1901430210012	PRERNA CHAUDHARY	8447674001	8800253694
11	A2019ME6772	1901430210013	SHIVAM PANDEY	8528179595	9919781825
12	A2019EN6477	1901430210014	TANYA SINGH	9548304153	9808661713
13	A2019EN6601	1901430210015	UTKARSH RAJ	9939736636	9576253617
14		Diploma	UPENDRA SINGH	8920346356	7838326469
15		Diploma	BURHAN HAMEED	6006374790	9596174760

Annexure-II

STUDY AND EVALUATION SCHEME OF ELECTRICAL & ELECTRONICS ENGINEERING

2nd Year **Semester-III**

Sl. No.	Subject Codes	Subject	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	KOE031-38/ KAS302	Engg. Science Course/Maths IV	3	1	0	30	20	50		100		150	4
2	KAS301/ KVE301	Technical Communication/ Universal Human values	2 3	1 0	0 0	30	20	50		100		150	3
3	KEE301	Electromagnetic Field Theory	3	1	0	30	20	50		100		150	4
4	KEE302	Electrical Measurements & Instrumentation	3	1	0	30	20	50		100		150	4
5	KEE303	Basic Signals & Systems	3	0	0	30	20	50		100		150	3
6	KEE351	Analog Electronics Lab	0	0	2				25		25	50	1
7	KEE352	Electrical Measurements and Instrumentation Lab	0	0	2				25		25	50	1
8	KEE353	Electrical Workshop	0	0	2				25		25	50	1
9	KEE354	Mini Project or Internship Assessment*	0	0	2			50				50	1
10	KNC301/ KNC302	Cyber Security/Environmental Science	2	0	0	15	10	25		50			0
11		MOOCs (Essential for Hons. Degree)											
		Total										950	22

**The Mini Project or internship (3-4 weeks) conducted during summer break after II semester and will be assessed during III semester.*

KEE302: ELECTRICAL MEASUREMENTS & INSTRUMENTATIONS

UNIT I

Electrical Measurements: Measurement system, Characteristics of instruments, Methods of measurement, Errors in Measurement & Measurement standards, Review of indicating and integrating instruments: Voltmeter, Ammeter and Wattmeter.

UNIT II

Measurement of Resistance, Inductance and Capacitance: Measurement of low, medium and high resistances, insulation resistance measurement, AC bridges for inductance and capacitance measurement.

UNIT III

Instrument Transformers: Current and Potential transformer, ratio and phase angle errors, design considerations and testing.

UNIT IV

Electronic Measurements: Electronic instruments: Voltmeter, Multimeter, Wattmeter & energy meter. Time, Frequency and phase angle measurements using CRO; Storage oscilloscope, Spectrum & Wave analyzer, Digital counter, frequency meter, and Digital Voltmeter.

UNIT V

Instrumentation: Transducers& sensors, classification & selection of sensors, Measurement of force using strain gauges, Measurement of pressure using piezoelectric sensor, Measurement of temperature using Thermistors and Thermocouples, Measurement of displacement using LVDT, Measurement of position using Hall effect sensors. Concept of signal conditioning and data acquisition systems, Concept of smart sensors and virtual instrumentation.

Text Books:

1) A K Sawhney, "Electrical & Electronic Measurement & Instrument", Dhanpat Rai & Sons, India
2) BC Nakra & K. Chaudhary, "Instrumentation, Measurement and Analysis," Tata McGraw Hill 2ndEdition
3) Purkait, "Electrical & Electronics Measurement & Instrumentation", TMH

Reference Books:

1) Forest K. Harris, "Electrical Measurement", Willey Eastern Pvt. Ltd. India
2) M. Stout , "Basic Electrical Measurement", Prentice Hall of India
3) WD Cooper, "Electronic Instrument & Measurement Technique", Prentice Hall International
4) EW Golding & F.C. Widdis, "Electrical Measurement &Measuring Instrument", AW Wheeler & Co. Pvt. Ltd. India

IMSENGINEERINGCOLLEGE	IMSEC/QF/42
FORMATS	Page1of1 IssueNo:02
CourseFileCoverPage	IssueDate:1May2010
Preparedby:MR	Approvedby:Director

	Particulars
1.	QualityPolicy(onleft inside coverof Course File)
2.	Institute Mission and Vision
3.	Departmental Mission and Vision
4.	Program Outcomes (PO)
5.	Program Educational Objectives (PEO) and Program Specific Outcomes (PSO)
6.	Academic Calendar
7.	Time Table
8	Student List
9.	University Evaluation Scheme
10.	Syllabus (Theory)
11.	Course Outcome, Mapping with PO/PSO
12.	Syllabus (Practical) with Experiment List mapped with Course Outcomes
13.	Topics beyond Syllabus
14.	Quiz/Assignment/Tutorial Records
15.	CT Question Paper (mapped with CO)
16.	Sessional Marks Analysis
17.	Lecture Notes/PPT
18.	Question Bank
19	Last three years University Question Paper (AKTU) with Solution
20	Attendance Register

NameandSignatureofCourseInstructor	SignatureofHoD

Space for Internal Auditor's Use

IMS ENGINEERING COLLEGE, GHAZIABAD

Vision of Institute

Our vision is to impart Vibrant, Innovative and Global Education to make IMS the world leader in terms of Excellence of Education, Research and to serve the nation in the 21st century.

Mission of Institute

- To develop IMSEC as a Centre of Excellence in Technical and Management Education.
- To inculcate in its students the qualities of Leadership, Professionalism, Executive Competence and Corporate understanding.
- To imbibe the enhance Human Values, Ethics and Morals in our students.
- To transform students into Globally Competitive Professionals.

Department of MBA

Vision

- To become a top management department imparting quality management education, undertaking innovative research and developing leaders who can add ethical, economic and social value to the organizations they work for and to the society as a whole.

Mission

1. Equip the students with the most advanced in demand management concepts and skills by adopting application based innovative pedagogy.
2. Evolve and establish an environment of academic excellence, research and innovation beneficial to students, faculty and external stakeholders.
3. Develop knowledge capital both scholarly and practice-oriented to meet the needs of emerging socio-economic environment.
4. Provide transformational and experiential learning to create responsible and ethical thought leaders.
5. Develop strong relationships with employers so as to understand their needs and thus, endeavour to bridge the skill gap between industry and academia.

Program Outcomes

PO1. Apply knowledge of management theories and practices to solve business problems.

PO2. Foster analytical and critical thinking abilities for data-based decision making.

PO3. Ability to integrate and utilize qualitative and quantitative tools and concepts to investigate and solve critical business problems.

PO4. Ability to develop Value based Leadership ability.

PO5. Ability to understand, analyze and communicate global, economic, legal, and ethical aspects of business.

PO6. Ability to lead themselves and others in the achievement of organizational goals contributing effectively to a team environment.

Program Educational Objectives

PEO1. Graduates of the program will be able to equip themselves with the fundamental theories, concepts and tools of management.

PEO2. Graduates will develop an understanding of applying relevant management tools and techniques in complex multi-disciplinary business situations for effective and efficient decision-making

PEO3. Graduates will learn to work in cross-functional teams through building upon their communication, interpersonal, motivational and leadership skills.

PEO4. Graduates will be able to develop curiosity for learning and innovation so that they can pursue higher studies or start their own ventures.

PEO5. Graduates will be able to become industry ready and inculcate professional ethics in themselves.

IMS ENGINEERING COLLEGE, GHAZIABAD
ACADEMIC CALENDAR (As per AKTU) (ODD SEM: 2020 - 21) [Version-1]

Oct-20

M	T	W	T	F	S	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

T/ W Days : 19/21

Nov-20

M	T	W	T	F	S	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

T/ W Days : (16+3)/20

Dec-20

M	T	W	T	F	S	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

T/ W Days : 17/24

Jan-21

M	T	W	T	F	S	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

T/ W Days : 15/22

Feb-21

M	T	W	T	F	S	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28

T/ W Days : 20/22

Mar-21

M	T	W	T	F	S	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

T/ W Days : 5/23

IMPORTANT DATES	HOLIDAYS	EXAMINATION / CLASS TEST
Commencement of Classes for 2nd, 3rd & 4th Yr: 5th Aug	**14, 15 & 16 NOV (SAT, SUN & MON):** Deepawali	CT-1 : 2nd-DEC to 8th-DEC, 2020
Commencement of Classes for 1st & 2nd (Lateral) 25th NOV	**30-NOV (MON) :** Guru Nanak's B'day	CT-2 : **19, 21, 26, 28-DEC, 2, 4 JAN 2021**
	25-DEC (FRI) : Christmas Day	PUT : **18th JAN to 23rd JAN, 2021**
	11-MAR (THU) : Maha Shivratri	**(3rd & 4th Year AKTU External)**
Upload Assignment (Important Dates)	**28-MAR (SUN) :** Holika Dahen	**AKTU** End Sem Exam (01-FEB to 20-FEB, 2021)
	29-MAR (MON) : Holi	**(1st & 2nd Year AKTU External)**
		AKTU End Sem Exam (08-MAR to 20-MAR, 2021)
		AKTU End Sem Practical Examination

Total Teaching Days/Working Days (T/W) : 60/132 [95/132]

Faculty members are requested to 1) Upload the attendance after completion of the class (L/T/P) itself on the same day.
2) Upload / Check / Submit the assignment as per schedule (weekly).

IMS ENGINEERING COLLEGE, GHAZIABAD
ACADEMIC CALENDAR (As per AKTU) (ODD SEM: 2019 - 20)

JUL

M	T	W	T	F	S	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30*	31				

T/ W Days : 3/25

AUG

M	T	W	T	F	S	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

T/ W Days : 19/22

SEP

M	T	W	T	F	S	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

T/ W Days : 15/22

OCT

M	T	W	T	F	S	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

T/ W Days : 14/20

NOV

M	T	W	T	F	S	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

T/ W Days : 15/23

DEC

M	T	W	T	F	S	S
						1
2	3	4	5	6	7	8
9	10#	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

T/ W Days : 0/23

IMPORTANT DATES

- Date of Registration for B.Tech(III, V, VII Sem) & MBA **26th & 27th JUL, 2019**
- Commencement of Classes: **29th JUL, 2019**
- Upload Assignment (Important Dates)
- **Freshers : 24th AUG, 2019**
- **Tech Fest 2019 (11th & 12th OCT)**
- **Cultural Fest-2019 (14th & 15th OCT)**

HOLIDAYS

- **12-AUG (MON) : Eid-Ul-Azha**
- **15-AUG (THU) :** Independence Day
- **15-AUG (THU) :** Raksha Bandhan
- **23-AUG (FRI) :** Janmashtmi
- **10-SEP (TUE) :** Moharram
- **02-OCT (WED):** Mahatma Gandhi Jayanti
- **7, 8-OCT (MON, TUE) : Dashehra**
- **27, 28 & 29 OCT (SUN, MON & TUE): Deepawali**

EXAMINATION / CLASS TEST

- 10-NOV (SUN) : Eid-UL-Milad -E-Nabi
- 12-NOV (TUE) : Guru Nanak's B'day
- 25-DEC (WED) : Christmas Day
- CT-1 : **02-SEP to 07-SEP, 2019**
- CT-2 : **5, 19, 21st OCT, 2, 4 & 9th NOV-2019**
- PUT : **25-NOV to 30-NOV, 2019**
- **#AKTU** End Sem Exam (10-DEC to 05-JAN, 2020)

30*-July : Kanwar (Jal Abhishek, Shivratri)

Total Teaching Days/Working Days (T/W) : 66/135

Faculty members are requested to 1) Upload the attendance after completion of the class (L/T/P) itself on the same day.
2) Upload / Check / Submit the assignment as per schedule (weekly).

FORMAT	Page 1 of 1
Class Time Table: Second Year	Issue No: 01
Prepared By: MR	Issue Date:1 May 2010
CLASS TIME TABLE FOR MBA 3rd Sem	Appoved By: Director
	W.E.F. 24-11-2020

Academic Session 2020-21 (ODD) Room No: A201

DAY/TIME	Period-1	Period-2	Period-3	Period-4	GAP	Period-5	Period-6	Period-7	Period-8
	9:00-9:50	9:50-10:40	10:40 - 11:30	11:30-12:20	12:20- 1:10	1:10-2:00	2:00-2:50	2:50-3:40	3:40 - 4:30
MON	KMB302 IBM (MB)	KMBMK-03 DM (AA)	KMBHR01 TM (AS)	KMBFM-03 FMS (MB)		KMBHR-02 PRM (AS)	KMBMK-01 SDM (AA)	KMBFM-01 IAPM (PR)	KMBFM02 TPM (SG)
TUE	KMBMK-03 DM (AA)	KMB302 IBM (MB)	KMBFM02 TPM (SG)	KMBFM-01 IAPM (PR)		KMBHR01 TM (AS)	KMBMK-01 SDM (AA)	KMBHR-02 PRM (AS)	KMBHR-03 ER&LL (PR)
WED	KMB301 SM (MV)	KMBMK02 CB (MB) A-201	KMBMK-03 DM (AA)	KMBFM-03 FMS (MB)	LUNCH	KMBFM-01 IAPM (PR)	KMBFM02 TPM (SG)	KMBHR-03 ER&LL (PR)	KMBHR-02 PRM (AS)
THU	KMBFM02 TPM (SG)	KMB302 IBM (MB)	KMB301 SM (MV)	KMBMK02 CB (MB) A-201		KMBHR01 TM (AS)	KMBHR-03 ER&LL (PR)	KMBHR-02 PRM (AS)	KMBMK-01 (SDM) (AA)
FRI	KMBFM-01 IAPM (PR)	KMB301 SM (MV)	Soft skill Class (AS)			KMBMK-01 SDM (AA)	KMBFM-03 FMS (MB)	KMB303 Summer Training Project Report	KMBMK02 CB (MB) A-201

Subject Code	Subject Name	Faculty Name			
KMB301	Strategic management	Dr. Monica Verma (MV)	KMBFM-02	Tax Planning & Management	Dr. Shashi Gupta
KMB302	International business Management	Dr. Meenu Baliyan (MB)	KMBFM-03	Financial Market & services	Dr. Meenu Baliyan (MB)
KMBMK-01	Sales & Distribution Management	Mr. Ashish Awasthi (AA)	KMBHR-01	Talent Management	Dr. Arunima Sirohi (AS)
KMBMK-02	Consumer Behaviour & Marketing Communication	Dr. Meenu Baliyan (MB)	KMBHR-02	Performance and Reward Management	Dr. Arunima Sirohi (AS)
KMBMK-03	Digital & Social Media Marketing	Mr. Ashish Awasthi (AA)	KMBHR-03	Employee Relations and Labour Laws	Ms. Punjika Rathi
Class Coordinator: Ms. Punjika Rathi			SS1	Soft skill Class	Dr. Arunima Sirohi (AS)
Time Table Coordinator : Dr. Meenu Baliyan					

HOD (MBA)

	Page 1 of 1	
Class Time Table: Second Year	Issue No: 01	
Prepared By: MR	Issue Date:1 May 2010	
CLASS TIME TABLE FOR MBA Third Sem W.E.F. 01-09-2020	Appoved By: Director	

DAY/TIME	PERIOD-1 (10:00-11:00)	PERIOD-2 (11:10- 12:10)	PERIOD-3 (12:20-01:20)	PERIOD-4 (2:00-03:00)	PERIOD-5 (3:00-4:00)
MON	KMB302 (IBM) MB	(KMBMK-03)DM (AA)	KMBFM02(TPM)(SG)	KMBHR-03 (IR&LL) PR	
TUE	KMB301 (SM) MV	KMBFM-01 (SAPM)(PR)	KMBFM-03 (FM&CB) MB	KMBHR01 (TM)AS	
WED	KMB302 (IBM) MB	KMBFM02(TPM)(SG)	(KMBMK-03)DM (AA)	KMBMK02 (CB) MB A-201	KMBHR-02 (PRM) (AS)
THU	KMB301 (SM) MV	KMBFM-01 (SAPM)(PR)	KMBMK02 (CB) MB A-201	KMBMK-01(SDM) (AA)	KMBHR01 (TM)AS
FRI	KMBMK-01(SDM) (AA)	KMBHR-03 (IR&LL) PR	KMBFM-03 (FM&CB) MB	KMBHR-02 (PRM) (AS)	

Subject Code	Subject Name	Faculty Name
KMB301	Strategic management	Dr. Monica Verma (MV)
KMB302	International business Management	Dr. Meenu Baliyan (MB)
KMBMK-01	Sales & Distribution Management	Mr. Ashish Awasthi (AA)
KMBMK-02	Consumer Behaviour	Dr. Meenu Baliyan (MB)
KMBMK-03	Digital Marketing	Mr. Ashish Awasthi (AA)
KMBFM-01	Security Analysis & Portfolio Management	Ms. Punjika Rathi
KMBFM-02	Tax Planning & Management	Dr. Shashi Gupta
KMBFM-03	Financial Market & Commercial Banking	Dr. Meenu Baliyan (MB)
KMBHR-01	Talent Management	Dr. Arunima Sirohi (AS)
KMBHR-02	Performance and Reward Management (KMBHR-02)	Dr. Arunima Sirohi (AS)
KMBHR-03	Industrial Relations and Labour Laws (KMBHR-03)	Ms. Punjika Rathi

Class Coordinator: Ms. Punjika Rathi

Time Table Coordinator : Dr. Meenu Baliyan

HOD (MBA)

IMS ENGINEERING COLLEGE				IMSEC/QF/43
FORMATS				Page 1 of 1
				Issue No: 02
Register of Students				Issue Date: 1 May 2010
Prepared by: MR				Approved by: Director
Programme		MBA	Subject Code	KMB FM02
Semester	III	Session 2020-21	Subject Name	TAX PLANNING & MANAGEMENT
Name of Instructor		DR. SHASHI GUPTA		

STUDENTS LIST

S.N.	University Roll No	Name of student
1	1901430700002	Abhirag saxena
2	1901430700012	Ashish pal
3	1901430700017	Eva Sangal
4	1901430700018	Ganesh Gupta
5	1901430700023	Komal Gupta
6	1901430700037	Prince Sharma
7	1901430700043	Raveena Kanojia
8	1901430700050	Shikha Singh
9	1901430700062	Vishal Gupta

MBA Scheme of Teaching & Evaluation for Session 2019-20

SEMESTER III

S. No.	Code	Course Title	Periods			Evaluation Scheme				Total	Credit
						Sessional Exams					
			L	T	P	CT	TA	Total	ESE		
1	KMB301	Strategic Management	4	0	0	30	20	50	100	150	3
2	KMB302	International Business Management	4	0	0	30	20	50	100	150	3
3		Specialization Group -1	4	0	0	30	20	50	100	150	3
		Elective 1*									
4		Specialization Group -1	4	0	0	30	20	50	100	150	3
		Elective 2*									
5		Specialization Group -1	4	0	0	30	20	50	100	150	3
		Elective 3*									
6		Specialization Group -2	4	0	0	30	20	50	100	150	3
		Elective 1*									
7		Specialization Group -2	4	0	0	30	20	50	100	150	3
		Elective 2*									
8	KMB303	Summer Training Project Report	2	0	0	0	0	50	100	150	3
		& Viva Voce									
		TOTAL							**800**	**1200**	**24**

Unit III (8 Hours)

Tax Planning & Management Tax Avoidance, Planning, & Evasion, Income Tax Authorities- Their appointment- Jurisdiction-Powers and functions- Provisions relating to collection and recovery of tax- Refund of tax, Offences, penalties and Prosecutions, Appeals and Revisions, Advance Tax, TDS, Advance Rulings, Avoidance of Double Taxation Agreements.

Unit IV (6 Hours)

Corporate Tax Computation of taxable income, Carry-forward and set-off of losses for companies, Minimum Alternative Tax (MAT), Set-off and Carry-forward of Amalgamation Losses, Tax Planning for Amalgamation, Merger and Demerger of Companies, Tax Provisions for Venture Capital Funds.

Unit V (6 Hours)

Introduction to GSTGST Concepts –Advantages and Limitations of VAT – GST as the preferred Tax Structure.Model of GST. Need for Tax Reforms, GST Principles – Single GST, Dual GST; Transactions covered under GST; Impact of GST. Registration and Filing: – Rates of Tax – Rates in Foreign Countries – In India; Assessment and Administration of GST.

Course Outcomes & Bloom's Taxonomy

After successful completion of this course students will be able to

CO 1: Understand about various Tax provisionsand Tax planning	K1 (Remember) K2(Understand)
CO 2: Understand the scope of tax planning concerning various business and managerial and strategic activities can be explored	K1(Remember) K2(Understand)
CO 3: Have knowledge about various Tax Dates, Rates and Forms	K2(Understand) K3(Apply)
CO 4: Measure Corporate Tax and Taxation in case of business restructuring	K1 (Remember) K2(Understand) K3(Apply)
CO 5: Understand how GST can be calculated & managed.	K1 (Remember) K2(Understand)

SUGGESTED READINGS

Text Books :

1. Dr. Vinod K. Singhania& Dr. Monica Singhania Students Guide to Income Tax (TaxmannPublication ,Latest Edition according to assessment year

Tax Planning & Management

Code: KMBFM02 Course Credits: 3 Teaching Hours: 36

Hrs COURSE OBJECTIVES:

- The present course aims at familiarizing the participants with the principles, problems and structure of different types of taxes in Indian economy.
- A student of taxation will have to make a detailed study of tax policy and tax provisions in India.
- A broad understanding or role of taxation in economic and industrial development of an economy.
- Acquaint about the relevance of direct and indirect taxes in taking corporate decisions.
- Familiarize students about the relevance of GST in taxation policy of the economy.

Course Credits 3 Contact Hours 36

Hrs Unit I (6 Hours)

Introduction: Definition, Cannons of Taxation Person, Assesse, Income, Previous Year, Assessment Year,Income Tax Important Dates and Forms. Residential Status & Tax Incidence: Individual Income Exempted from Tax.

Unit 2 (10 Hours)

Heads Of Income Heads of Income – Salaries, Income from House Property, Profits & Gains from Business or Profession, Capital Gains, Income from Other sources., Clubbing of incomes, Calculation of Taxable Income ,Tax Calculation including Surcharge and Marginal relief,Deduction, Rebate, Relief, Set Off & Carry Forward of Losses – Principles, Meaning, Inter – sources & Inter – head Set Off.

Unit III (8 Hours)

Tax Planning & Management Tax Avoidance, Planning, & Evasion, Income Tax Authorities- Their appointment- Jurisdiction-Powers and functions- Provisions relating to collection and recovery of tax- Refund of tax, Offences, penalties and Prosecutions, Appeals and Revisions, Advance Tax, TDS, Advance Rulings, Avoidance of Double Taxation Agreements.

Unit IV (6 Hours)

Corporate Tax Computation of taxable income, Carry-forward and set-off of losses for companies, Minimum Alternative Tax (MAT), Set-off and Carry-forward of Amalgamation Losses, Tax Planning for Amalgamation, Merger and Demerger of Companies, Tax Provisions for Venture Capital Funds.

Unit V (6 Hours)

Introduction to GSTGST Concepts –Advantages and Limitations of VAT – GST as the preferred Tax Structure.Model of GST. Need for Tax Reforms, GST Principles – Single GST, Dual GST; Transactions covered under GST; Impact of GST. Registration and Filing: – Rates of Tax – Rates in Foreign Countries – In India; Assessment and Administration of GST.

Course Outcomes & Bloom's Taxonomy

After successful completion of this course students will be able to

CO 1: Understand about various Taxprovisionsand Tax planning	K1 (Remember) K2(Understand)
CO 2: Understand the scope of tax planning concerning various business and managerial and strategic activities can be explored	K1(Remember) K2(Understand)
CO 3: Have knowledge about various Tax Dates, Rates and Forms	K2(Understand) K3(Apply)
CO 4: Measure Corporate Tax and Taxation in case of business restructuring	K1 (Remember) K2(Understand) K3(Apply)
CO 5: Understand how GST can be calculated & managed.	K1 (Remember) K2(Understand)

SUGGESTED READINGS

Text Books :

2. Dr.B.K. Agarwal& Dr. Rajeev Agarwal Tax Planning and Management(NirupamPublication,Latest Edition according to assessment year)

3. Paolo M. Panteghini Corporate Taxation in a Dynamic World (Springer, Latest Edition)

4. GirishAhuja& Ravi Gupta Direct Tax Laws & Practice (Bharat Law House, Latest Edition)

5.Datey V.S. - Indirect Taxes – Law & Practice (Taxman ,Latest Edition) 6.E. A. Srinivas Corporate Tax Planning(Tata McGraw Hill, Latest Edition)

Reference Books &Journals :

1. Dr.Vinod K. Singhania& Dr. KapilSinghania Students Guide to Income Tax (TaxmannPublication ,Latest Edition)

2. Parthasarathy Corporate Governance: Principles, Mechanisms & Practice (Wiley, Latest Edition)

3. H. P. Ranina Corporate Taxation (Orient Law House, Latest Edition)
4.Balachandran- Indirect Taxes (PHI, Latest Edition)

5.Income Tax Reports, Company Law institute of India PvtLtd(Chennai Latest Edition) 6.Taxman, Taxman Allied SerivesPvtLtd.(New DelhiLatest Edition)

Employable Skills:

Skill	Measurement tool
Analytical skills	Cases and discussions
Tax calculation and filing skills	Cases ,Exercises
GST Calculation	Exercise and workshop

COURSE FILE

SUBJECT	:	Manufacturing Processes
SUBJECT CODE	:	KME 403
NAME OF FACULTY	:	B N Pathak
BATCH	:	II Year ME (2019-2020)

Department of Mechanical Engineering
IMS Engineering College, Ghaziabad

IMS ENGINEERING COLLEGE	IMSEC/QF/42
FORMATS	Page 1 of 1
Course File Cover Page	Issue No: 02
Prepared by: MR	Issue Date: 1 May 2010
	Approved by: Director

1.	Quality Policy (on left inside cover of Course File)	IMSEC/QM/5.3
2.	Institute Mission and Vision	
3.	Departmental Mission and Vision	
4a	List of Course Outcomes	
4b.	List of Program Outcomes	
4c.	List of Program Specific Outcomes	
5.	Academic Calendar	
6.	Syllabus & Evaluation scheme	
7.	Student List	IMSEC/QF/45
8	Course outcomes mapping and attainment	
9	Lecture Notes unit wise including PPTs	
10.	Topics covered beyond Syllabus	
11.	Short answers question bank (20 Questions per unit)	
12.	Long answers question bank (40-50) questions	
13.	Assignment sheets (unit wise)	IMSEC/QF/48
14.	Tutorials Sheets -20 per unit (only for numerical based portions)	
15.	Solution to tutorial sheets	
16.	Sessional Question Papers	IMSEC/QF/49
17.	Last three years university question papers	
18.	Any other relevant information	

Name and Signature of Course Instructor	Signature of HoD
(B.N. Pathak)	

Space for Internal Auditor's Use

Signatures with date please

IMS ENGINEERING COLLEGE GHAZIABAD

DEPARTMENT OF MECHANICAL ENGINEERING

VISION OF INSTITUTE

Our vision is to impart vibrant innovative and global education and to make IMS the world leader in terms of excellence of education, research and to serve the nation in the 21st century.

MISSION OF INSTITUTE

- To develop IMSEC as a centre of excellence in technical and management education.
- To inculcate in its students, the qualities of leadership, professionalism, corporate understanding & executive competence.
- To imbibe & enhance human values, ethics & morals in our students.
- To transform students into globally competent professionals.

VISION OF DEPARTMENT

Our vision is to provide excellent education that creates the new opportunities for students to meet the current and future challenges of technological development in mechanical engineering.

MISSION OF DEPARTMENT

1. To provide students with a sound mechanical engineering education for a successful career.
2. To impart quality education to the students and enhance their domain knowledge as well as soft skills to make them globally competitive mechanical engineers.
3. Respond effectively to the needs of the industry with changing technology scenario.
4. Encouraging culture of continuous teaching and learning process by adopting latest technology and methodology.
5. To develop the professional ethics and human values for the welfare of society.

IMS ENGINEERING COLLEGE GHAZIABAD

DEPARTMENT OF MECHANICAL ENGINEERING

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

In order to prepare our students for successful career in engineering, the Mechanical Engineering Department maintains an academic program with the following program educational objectives:

PEO-1 To prepare students for successful career in industry that meet the needs of Indian and multinational companies.

PEO-II To provide students with a sound foundation in the mathematical, scientific and engineering fundamentals necessary to formulate, solve and analyze engineering problems and to pursue higher studies.

PEO-III To develop creative ability among students by utilizing their technical competence in design, manufacturing and product development.

PEO-IV To promote awareness in students for life-long learning and to introduce them about professional issues of mechanical engineering including ethics, global economy and emerging technologies.

PEO-V To foster important job related skills such as improved oral and written communications and experience of working as a team.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

Program Specific Outcomes(PSOs)	Statement
PSO 1	Graduates shall have an ability to apply fundamental knowledge of mathematics, applied science, engineering and management for the solution of mechanical engineering problems.
PSO 2	Graduates shall have an ability to enhance their technical and professional skills to utilize their knowledge in specification, fabrication, testing and operation of basic mechanical systems/processes.
PSO 3	Graduates shall have an ability to apply learned principles to the design, analysis, development and implementation of advanced mechanical systems.

IMS ENGINEERING COLLEGE GHAZIABAD

DEPARTMENT OF MECHANICAL ENGINEERING

PROGRAMME OUTCOMES (POs)

Program Outcomes (POs)	Domain	Statement
PO1	Engineering knowledge	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem analysis	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/ development of solutions	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex problems	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern tool usage	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	The engineer and society	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and sustainability	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and team work	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project management and finance	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-long learning	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

IMS ENGINEERING COLLEGE	YEAR: II
Lab File Content	SEMESTER: IV
	SUBJECT: Manufacturing Processes
LIST OF COURSE OUTCOMES	CODE: KME 403
Prepared By: Dr. B.N. Pathak	**Approved By: HOD**

LIST OF COURSE OUTCOMES

CO1	Students should be able to understand importance of the casting method, design considerations and their types, metal forming processes and their analysis & sheet metal operations like cup/deep drawing and bending.
CO2	Students should be able to understand metal cutting operation.
CO3	Students should be able to learn grinding and super finishing processes.
CO4	Students should be able to Identify the use and applications of welding equipment.
CO5	Students should be able to learn the basics of unconventional machining processes.

IMS ENGINEERING COLLEGE, GHAZIABAD

ACADEMIC CALENDAR (EVEN SEM: 2019 - 20)

Jan-20

M	T	W	T	F	S	
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

T/ W Days : 05/25

Feb-20

M	T	W	T	F	S	
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	

T/ W Days : (14+2 Sat)/22

Mar-20

M	T	W	T	F	S	
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

T/ W Days : (19+2 Sat)/22

Apr-20

M	T	W	T	F	S	
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

T/ W Days : (11+1 Sat)/22

May-20

M	T	W	T	F	S	
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

T/ W Days : 0/23

Jun-20

M	T	W	T	F	S	
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

T/ W Days : 0/23

IMPORTANT DATES	HOLIDAYS	EXAMINATION / CLASS TEST
Reg. date (For All) : 22nd to 25th JAN, 2020	26-Jan : Republic Day (SUNDAY)	CT-1 : 24th Feb to 29th Feb, 2020
Commencement of Classes : 27th JAN,2020	21-Feb : Maha Shivratri (FRIDAY)	CT-2 : 7th, 14th, 16th, 23rd, 28th & 30th Mar-20
	09-Mar : Holika Dahan (MONDAY)	PUT : 20th Apr to 25th Apr, 2020
	10-Mar : Holi (TUESDAY)	
	2-Apr : Ram Navmi (THURSDAY)	AKTU End Sem Exam (06-May to 30-May, 2020)
Alumni meet : 7th Mar, 2020	14-Apr : Dr. Ambedkar Jayanti (TUESDAY)	AKTU Practical Exam (31-May to 08-June, 2020)
VIBGYOR: 20th & 21st March, 2020	7-May : Budh Purnima (THURSDAY)	
Farewell party for final year: 17th Apr, 2020	25-May : Eid-Ul-Fitar (MONDAY)	Upload Assignment (Important Dates)

Total Teaching Days/Working Days (T/W) : 49+All Even Saturday (5) /137

IMPORTANT NOTE : ALL EVEN SATURDAY WILL BE TEACHING DAY

Faculty members are requested to 1) Upload the attendance after completion of the class (L/T/P) itself on the same day.
2) Upload / Check / Submit the assignment as per schedule (weekly).

IMS ENGINEERING COLLEGE	IMSEC/QF/45
FORMATS	Page 1 of 1
	Issue No: 02
Syllabus	Issue Date: 1 May 2010
Prepared by: MR	**Approved by: Director**

Subject Code: KME 403	**Subject Name:** Manufacturing Processes	**Semester:** 4th
Session: 2019-20	**Name of Instructor:** B N Pathak	**Batch:** ME

L-T-P
3-1-0

Objectives:
To motivate and challenge students to understand and develop an appreciation of the processes in Correlation with material properties which change the shape, size and form of the raw materials into the desirable product by conventional or unconventional manufacturing methods.

UNIT-I
Conventional Manufacturing processes:
Casting and moulding: Metal casting processes and equipment, Heat transfer and solidification, shrinkage, riser design, casting defects and residual stresses. Introduction to bulk and sheet metal forming, plastic deformation and yield criteria; fundamentals of hot and cold working processes; load estimation for bulk forming (forging, rolling, extrusion, drawing) and sheet forming (shearing, deep drawing, bending) principles of powder metallurgy.

UNIT-II
Metal cutting: Single and multi-point cutting; Orthogonal cutting, various force components: Chip formation, Tool wear and tool life, Surface finish and integrity, Machinability, cutting tool materials, cutting fluids, Coating; Turning, Drilling, Milling and finishing processes, Introduction to CNC machining. Additive manufacturing: Rapid prototyping and rapid tooling Joining/fastening processes: Physics of welding, brazing and soldering; design considerations in welding, Solid and liquid state joining processes; Adhesive bonding.

UNIT-III
Grinding & super finishing:
Grinding: Grinding wheels, abrasive & bonds, cutting action. Grinding wheel specification. Grinding wheel wear - attritions wear, fracture wear. Dressing and Truing. Max chip thickness and Guest criteria. Surface and cylindrical grinding. Centerless grinding. Super finishing: Honing, lapping and polishing.

UNIT-IV
Metal Joining (Welding):
Survey of welding and allied processes. Gas welding and cutting, process and equipment. Arc welding: Power sources and consumables. TIG & MIG processes and their parameters. Resistance welding - spot, seam projection etc. Other welding processes such as atomic

hydrogen, submerged arc, electro slag, friction welding. Soldering & Brazing. Adhesive bonding. Weld decay in HAZ.

UNIT-V

Unconventional Machining Processes:

Abrasive Jet Machining, Water Jet Machining, Abrasive Water Jet Machining, Ultrasonic Machining, principles and process parameters. Electrical Discharge Machining, principle and processes parameters, MRR, surface finish, tool wear, dielectric, power and control circuits, wire EDM; Electrochemical machining (ECM), etchant &maskant, process parameters, MRR and surface finish. Laser Beam Machining (LBM), Plasma Arc Machining (PAM) and Electron Beam Machining.

Course Outcomes:

Upon completion of this course, students will be able to understand the different conventional and unconventional manufacturing methods employed for making different products.

Books and References:

1. Kalpakjian and Schmid, Manufacturing processes for engineering materials (5th Edition)- Pearson India, 2014.
2. Mikell P. Groover, Fundamentals of Modern Manufacturing: Materials, Processes, and Systems.
3. Manufacturing Technology by P.N. Rao., MCGRAW HILL INDIA.
4. Materials and Manufacturing by Paul Degarmo.
5. Manufacturing Processes by Kaushish, PHI.
6. Principles of Foundry Technology, Jain, MCGRAW HILL INDIA
7. Production Technology by RK Jain.
8. Degarmo, Black &Kohser, Materials and Processes in Manufacturing.

IMS ENGINEERING COLLEGE, GHAZIABAD
ELECTRICAL & ELECTRONICS ENGG. DEPARTMENT
Result Analysis of EN, 3rd yr
SUBJECT- POWER SYSTEM-I (KEE501)

Sr. No	Roll No	Name	CT-1 (30)	CT-2 (30)	TEST-3 (100)
1	1814321001	AADARSH KUSHWAHA	6	13	57
2	1814321002	AAKASH SINGH	A	24	76
3	1814321003	AAKRITI MITTAL	A	27	72
4	1814321004	ABHISHEK	A	24	70
5	1814321005	ACHINT JINDAL	A	25	76
6	1814321006	AISHWARYA ARORA	A	28	74
7	1814321007	AKASH KUSHWAH	A	26	72
8	1814321008	AKHIL BHATIA	7	Absent	77
9	1814321009	AMAN DEEP SINGH	A	16	72
10	1814321010	ANKIT KUMAR CHAURASIYA	A	20	67
11	1814321011	ASHIRWARD PANDEY	A	Absent	53
12	1814321012	DHARMENDRA KUMAR .	A	13	60
13	1814321013	DHRUV BHARADWAJ	A	26	70
14	1814321014	DHRUV RAWAT	A	25	59
15	1814321015	DIVYANSHU MISRA	A	22	77
16	1814321016	GHANESH SINGH	A	26	78
17	1814321017	HARIOM .	A	25	73
18	1814321018	HARSH PARASHAR	A	16	64
19	1814321019	HARSHIT KUMAR	8	20	69
20	1814321020	HEMANT KUMAR SINGH	A	18	43
21	1814321021	KAILASH PAL	6	12	53
22	1814321022	KISHAN KUMAR	A	20	59
23	1814321023	MANIK GAUR	A	21	47
24	1814321024	MANOJ YADAV	14	15	57
25	1814321025	MOHAMMAD JAHID	A	18	46
26	1814321026	MOHD ALBER SHAH KHAN	A	20	60
27	1814321027	PAWAN KASHYAP	0	12	30
28	1814321028	PRATHAM GUPTA	A	22	49
29	1814321029	PRIYAM CHANDRA	A	24	78
30	1814321030	PUSHPENDRA YADAV	A	23	68
31	1814321031	RIYA SINGH	A	27	63
32	1814321032	RUDRANSH CHAUDHARY	A	16	40
33	1814321033	SACHIN KUMAR YADAV	26	23	64
34	1814321034	SHIVAM RAJPUT	A	23	73
35	1814321035	SHIVAM MISHRA	15	19	61
36	1814321036	SHREYA SACHAN	A	24	75
37	1814321037	SHUBHAM DUBEY	20	25	77
38	1814321038	SIDHARTH KUMAR SINGH	A	18	56
39	1814321039	SURAJ PRAKASH	A	20	59
40	1814321041	VED PRAKASH KUMAR	A	22	77
41	1814321042	VIKRANT ANKOLA	A	10	59
42	1901430219001	SHIVAM GOEAL	A	17	53

Result Analysis	CT-1	CT-2	TEST-3
Number of Students in Section	42	42	42
Number of Students Present	9	40	42
Total Pass student	4	39	41
Pass %(≥40%)	44.40%	97.50%	97.61%
Average Marks	11.1	20.625	63.40
Highest Marks	26	28	78

10/02/21
Atul Kumar Kushwaha
(Subject Teacher)

11/02/21
Mr. Vijay Kumar
(HOD-EN)

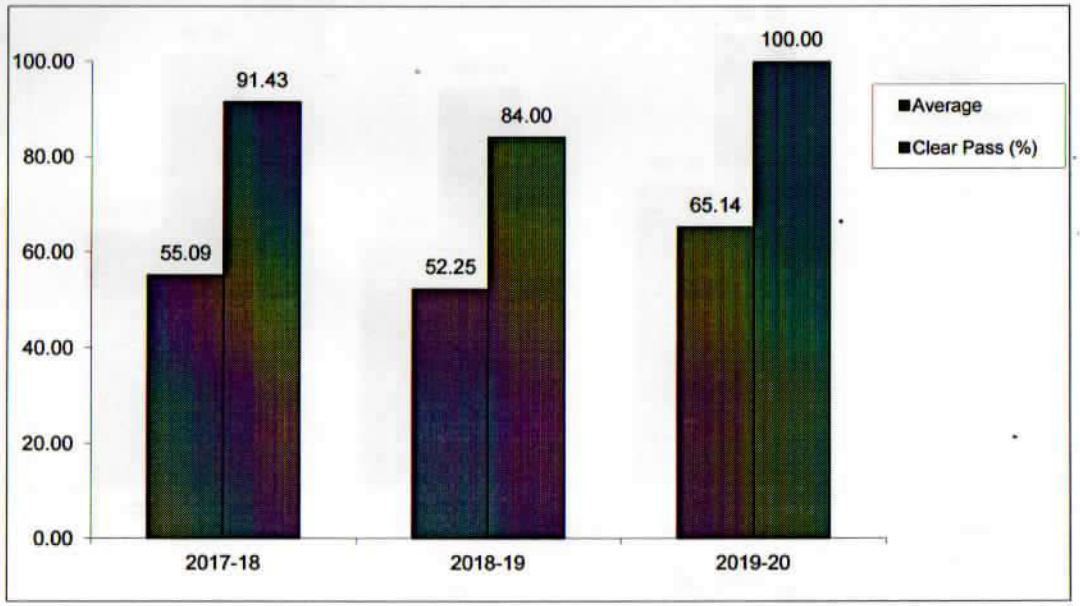
(.S ENGINEERING COLLEGE, GHAZIAL .D

Department of Electronics & Communication Engineering

Result Analysis for EC1 3rd Year Even Semester 2019-20

Subject Name	Subject Code	Session: 2017-18				Session: 2018-19				Session: 2019-20					Avg Diff. wrt 2017-18	Avg Diff. wrt 2018-19
		Students	Average	Pass %	CP	Students	Average	Pass %	CP	Students	Result Declared	Average	Pass %	CP		
INDUSTRIAL MANAGEMENT	RAS 601	35	58.74	100	0	50	55.94	100	0	35	35	66.29	100	0	7.55	10.35
CYBER SECURITY	RUC 601	N.A.				50	54.83	100	0	35	35	65.59	100	0	N.A.	10.76
CONTROL SYSTEM 1	RIC 603	35	56.89	100	0	50	49.34	90	5	35	35	66.29	100	0	9.40	16.95
MICROWAVE ENGINEERING	REC 601	35	51.86	97.14	1	50	52.37	98	1	35	35	65.80	100	0	13.94	13.43
DIGITAL COMMUNICATION	REC 602	35	50.40	97.14	1	50	52.06	90	5	35	35	60.45	100	0	10.05	8.39
ADVANCE DIGITAL DESIGN USING VERILOG	REC 064	35	58.74	100	0	50	48.97	92	4	22	22	65.00	100	0	6.26	16.03
RADAR ENGINEERING	REC 065	N.A.				N.A.				13	13	68.79	100	0	N.A.	N.A.
Overall Pass%		91.43				84				100					100.00	16.00
Class Average		55.09				52.25				65.14					65.14	12.89

Subject Name	Code	Faculty Name
INDUSTRIAL MANAGEMENT	RAS 601	Prof. Sunil Kr Pandey (ME)
CYBER SECURITY	RUC 601	Prof. Sameer Anand (EN)
CONTROL SYSTEM 1	RIC 603	Prof. Myurika Saxena
MICROWAVE ENGINEERING	REC 601	Prof. Praveen Chourasia
DIGITAL COMMUNICATION	REC 602	Prof. Balwant Singh
ADVANCE DIGITAL DESIGN USING VERILOG	REC 064	Prof. Pankaj Goel
RADAR ENGINEERING	REC 065	Prof. Arjun Singh Katiyar



(HOD, ECE) 05/08/2020

S ENGINEERING COLLEGE, GHAZIAB D

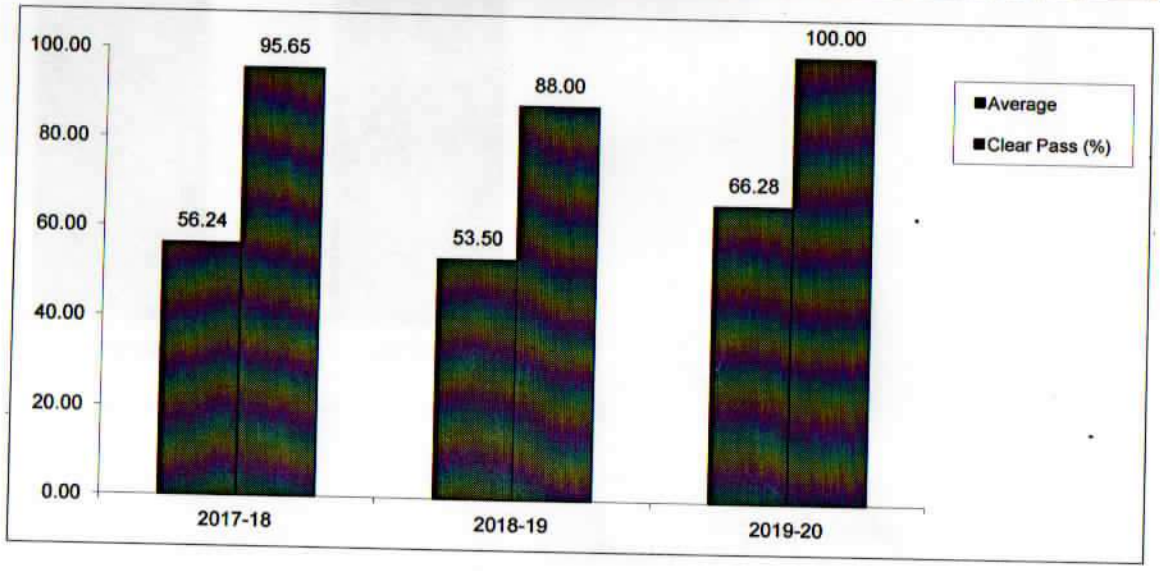
Department of Electronics & Communication Engineering

Result Analysis for EC2 3rd Year Even Semester 2019-20

Subject Name	Subject Code	Session: 2017-18				Session: 2018-19				Session: 2019-20					Avg Diff. wrt 2017-18	Avg Diff. wrt 2018-19
		Students	Average	Pass %	CP	Students	Average	Pass %	CP	Students	Result Declared	Average	Pass %	CP		
INDUSTRIAL MANAGEMENT	RAS 601	46	58.22	100	0	50	57.06	100	0	36	36	66.51	100	0	8.29	9.45
CYBER SECURITY	RUC 601	N.A.				50	58.97	100	0	36	36	66.03	100	0	N.A.	7.06
CONTROL SYSTEM 1	RIC 603	46	56.89	100	0	50	54.57	100	0	36	36	66.27	100	0	9.38	11.70
MICROWAVE ENGINEERING	REC 601	46	56.04	100	0	50	51.37	94	3	36	36	66.11	100	0	10.07	14.74
DIGITAL COMMUNICATION	REC 602	46	54.22	97.82	1	50	50.31	94	3	36	36	66.51	100	0	12.29	16.20
ADVANCE DIGITAL DESIGN USING VERILOG	REC 064	46	60.56	100	0	50	48.74	96	2	23	23	67.08	100	0	6.52	18.34
RADAR ENGINEERING	REC 065	N.A.				N.A.				13	13	64.84	100	0	N.A.	N.A.
Overall Pass%		95.65				88				100.00					4.35	12.00
Class Average		56.24				53.50				66.28					10.04	12.78

Subject Name	Code	Faculty Name
INDUSTRIAL MANAGEMENT	RAS 601	Prof. Sunil Kr Pandey (ME)
CYBER SECURITY	RUC 601	Prof. Sameer Anand (EN)
CONTROL SYSTEM 1	RIC 603	Prof. Praveen Kumar
MICROWAVE ENGINEERING	REC 601	Prof. Praveen Chourasia
DIGITAL COMMUNICATION	REC 602	Prof. Balwant Singh
ADVANCE DIGITAL DESIGN USING VERILOG	REC 064	Prof. Pankaj Goel
RADAR ENGINEERING	REC 065	Prof. Arjun Singh Katiyar

(HOD, ECE) 05/08/2020



Department of Mechanical Engineering

Result Analysis for B.Tech (EVEN SEM)ME1 2nd Year (2019-20)

Subject	Session 2017-18				Session 2018-19				Session 2019-20				Diff w.r.t 2018-19	Diff w.r.t 2017-18
	Average	Students	Pass %	CP	Average	Students	Pass %	CP	Average	Students	Pass %	CP		
KAS-402 Universal Human Values	62.68	54	100	0	55.54	34	97.058	1	62.72	51	100	0	7.18	0.04
KAS-401 Mathematics IV	52.06	54	96.3	2	51.714	34	100	0	62.54	51	100	0	10.83	10.48
KME-401 Applied Thermodynamics	51.1	54	94.4	3	38.857	34	91.17	3	62.6	51	100	0	23.74	11.5
KME-403 Manufacturing Processes	56.3	54	96.3	2	43.486	34	94.11	2	62.64	51	100	0	19.15	6.34
KME-402 Engineering Mechanics									62.52	51	100	0	NA	NA
KME-401 Measurement and Metrology	55.07	54	96.3	2	36	34	88.23	4						
KEE-409 Electrical Machines & Control	51.07	54	94.4	3	52.98	34	97	1						
Average - Class	54.71		96.28		46.42	34	94.59							
Clear Pass %	85.18%				67.64%				100.00%					

SUB. CODE	SUBJECT NAME	FACULTY NAME	AVG.	PASS %
KAS402	Maths IV	Mr. PRAVESH SRIVASTAVA	62.54	100.00
KVE401	Universal Human Values	Mr. SHIV OM SHARMA	62.72	100.00
KME401	Applied Thermodynamics	Dr. S K KALLA	62.60	100.00
KME402	Engineering Mechanics	Dr. PANKUL GOEL	62.52	100.00
KME403	Manufacturing Processes	Dr. B N PATHAK	62.64	100.00
KNC401	Computer System Security	Dr. UPASNA PANDEY		

ALL CLEAR	51
ALL CLEAR %	100.00
OVERALL AVERAGE MARKS	62.6

DEPARTMENT OF MECHANICAL ENGINEERING

Result Analysis for B.Tech ME1 3rd Year (EVEN SEMESTER) (Session 2019-20)

Subject	SESSION 2017-18				SESSION 2018-19				SESSION 2019-20				difference w.r.t 2017-18	difference w.r.t 2018-19
	Average	Students	Pass%	CP	Average %	Students	Pass%	CP	Average %	Students	Pass%	CP		
RAS601 (Industrial Management)	57.13	53	100	0	57.99	54	98.14	1	62.37	35	100	0	5.238	4.384
RUC601 (Cyber Security)					59.37	54	100	0	62.12	35	100	0	62.120	2.749
RME601(Fluid Machinery)	59.20	25	100	0	55.90	54	96.29	2	62.45	35	100	0	3.250	6.550
RME602 (Theory of Machines)	59.77	53	98	1	50.77	54	90.74	5	61.88	35	100	0	2.106	11.109
RME603 (Machine Design-II)	55.36	53	100	0	52.30	54	94.44	3	62.33	35	100	0	6.972	10.030
RME061 (RAC)	51.63	53	96.22	2	70.53	30	100	0	64.84	18	100	0	13.215	-5.689
RME062 (PPC)					52.79	24	100	0	59.83	17	100	0	59.830	7.044
NME-011 (OPTIMIZATION)	54.49	53	100	0										
NME024 (UCMP)	55.71	28	100	0										
Average - Class	56.18				57.09				62.27					
Clear Pass %	94.40%				87.03%				100.00%					

Subject Name	Average %	FACULTY
RAS601 (Industrial Management)	62.37	Dr. B. N. Pathak
RUC601 (Cyber Security)	62.12	Mr. Sumit Sharma
RME601(Fluid Machinery)	62.45	Mr. Om Prakash Umrao
RME602 (Theory of Machines)	61.88	Mr. Ajay Singh Parmar
RME603 (Machine Design-II)	62.33	Mrs. Mubina Shekh
RME061 (RAC)	64.84	Mr. Gaurav Mishra
RME062 (PPC)	59.83	Mr. Ankit Saxena

Dr. V. K. Saini
HOD,ME

DEPARTMENT OF MECHANICAL ENGINEERING

Result Analysis for B.Tech ME2 3rd Year (EVEN SEMESTER) (Session 2019-20)

Subject	SESSION 2017-18				SESSION 2018-19				SESSION 2019-20				difference	difference
	Average	Students	Pass%	CP	Average %	Students	Pass%	CP	Average %	Students	Pass%	CP	w.r.t 2017-	w.r.t 2018-
(R.A.S601 (Industrial Management)	60	56	100	0	56.66	56	100	0	63.43	35	100	0	3.429	6.770
(R.U.C601 (Cyber Security)					59.46	56	100	0	63.43	35	100	0	63.429	3.964
(RME-602(Fluid Machinery)	55	36	100	0	57.09	56	100	0	63.00	35	100	0	8.000	5.908
(RME-602 (Theory of Machines)	60.6	56	98.21	1	57.19	56	96.43	2	63.14	35	100	0	2.543	5.949
(RME603 (Machine Design-II)	48.05	56	92.85	4	57.63	56	98.21	1	63.43	35	100	0	15.379	5.801
(RME061 (RAC)	51.5	56	100	0	66.35	36	97.22	1	66.43	13	100	0	14.929	0.079
(RME062 (PPC)					50.43	20	95.00	1	61.63	21	100	0	61.629	11.200
(RME-611(OPTIMIZATION)	59.3	56	100	0										
(RME624 (UCMP)	56.5	20	100	0										
Average - Class	55.85				57.83				63.50					
Clear Pass %	92.85%				94.64%				100.00%					

Subject Name	Average %	FACULTY
(R.A.S601 (Industrial Management)	63.43	Mr. Abhishek Saxena
(R.U.C601 (Cyber Security)	63.43	Mr. Amit Pandey
(RME-602(Fluid Machinery)	63.00	Mr. Om Prakash Umrao
(RME-602 (Theory of Machines)	63.14	Mr. Ajay Singh Parmar
(RME603 (Machine Design-II)	63.43	Mrs. Sumit Sharma
(RME061 (RAC)	66.43	Mr. Gaurav Mishra
(RME062 (PPC)	61.63	Mr. Ankit Saxena

OVERALL RESULT ANALYSIS			
Academic Year	2017-18	2018-19	2019-20
Total No. of Students in IIIrd Year	104	110	70
Total No. of Students clear pass	97	100	69
Overall Clear pass %	93.27	90.91	100
Overall average marks	55.4	57.46	62.88

NOTE : Result of one student (1714340071) is not declared.

Dr. V. K. Saini
HOD,ME

Department of Mechanical Engineering

Result Analysis for B.Tech ME1 4th Year , 8th Sem. (2019-20)

Subject	Session:2017-18				Session:2018-19				Session:2019-20				Difference w.r.t 2017-2018	Difference w.r.t 2018-19
	Average	Students	Pass %	CP	Average	Students	Pass %	CP	Average	Students	Pass %	CP		
NME-801 PW plant	57.98	62	100	NIL	56.58	53	98.11	1	NA				NA	NA
NME-051/055/RME-081 OR/AWT/AW	(67.44/56.76) 62.1	25/37	100	NIL	(60.34/54.76) 57.55	21/32	100	NIL	60.39	30	100	NIL	-1.71	2.84
NME-065/062/ RME-080 PM/NDT	(61.72/60.69) 61.2	37/25	100	NIL	(56.73/56.19) 56.46	22/31	100	NIL	56.13	25	100	NIL	-5.07	-0.33
NOE-081/ROE-086 NCER/R.ENERGY	70.43	62	100	NIL	65.23	53	100	NIL	55.96	30	100	NIL	-14.47	-9.27
ROE-082/ EDP									70.83	25	100	NIL	NA	
RME-085/ TQM									63.25	48	100	NIL	NA	
RME-086/ GDP									60.48	7	100	NIL	NA	
Average - Class	62.9				58.96				61.17					
No. of Carry over				NIL								NIL		
Clear pass %	100%				100%				100%					

Subject	Faculty	Average Marks	Results not declared	Total no. of students
ROE-082	Mr Ankit Saxena	70.83	0	25
ROE-086	Mr V K Jain	55.96	0	30
RME-080	Mr Abhishek Saxena	56.13	0	25
RME-081	Dr V K Saini	60.39	0	30
RME-085	Dr Pankaj Goel	63.25	0	48
RME-086	Mr Gaurav Kumar Mishra	60.48	0	7

Dr. V.K. Saini
HOD,ME

Result Analysis for B.Tech ME2 4th Year , 8th Sem. (2019-20)

Subject	Session:2017-18				Session:2018-19				Session:2019-20				Difference w.r.t 2017-	Difference w.r.t 2018-
	Average	Students	Pass %	CP	Average	Students	Pass %	CP	Average	Students	Pass %	CP		
NME-801 PW plant	58.75	60	100	NIL	51.69	56	100	NIL	NA				NA	NA
NME-051/055/RME-081 OR/AWT/AW	(69/58.11) 63.55	24/36	100	NIL	(62.46/54.78) 58.62	25/31	100	NIL	62.48	38	100	NIL	-1.07	3.86
NME-065/062/ RME-080 PM/NDT	(65.75/56.59) 61.17	32/28	100	NIL	(57.96/53.13) 55.55	31/25	100	NIL	58.99	18	100	ABSE	-2.18	3.44
NOE-081/ROE-086 NCER/R.ENERGY	69.52	60	100	NIL	67.1	56	100	NIL	53.22	35	100	NIL	-16.30	-13.88
ROE-082/ EDP									75.07	21	100	ABSE	NA	
RME-085/ TQM									68.46	52	100	ABSE	NA	
RME-086/ GDMP									62.14	4	100		NA	
Average - Class	63.25				58.32			NIL	63.40	01 ABSENT				
No. of Carry over				NIL										
Clear pass %	100%				100%				100%					

Subject	Faculty	Average Marks	Result not declared	Total no. of students
ROE-082	Mr. Ankit Saxena	75.07	0	21
ROE-086	Mr. V. K. Jain	53.22	0	35
RME-080	Mr. Abhishek Saxena	58.99	0	18
RME-081	Dr. V. K. Saini	62.48	0	38
RME-085	Ms. Mubina Sheikh	68.46	0	52
RME-086	Mr. Gaurav Kumar Mishra	62.14	0	4

Overall Result Analysis for B.Tech ME 4th Year, even Sem. Session (2019-20)

Overall Result 4th year	2017-18	[redacted]	2019-20
Total No. of Students in 4th Year	176/177	[redacted]	111
Total No. of Students clear pass	176	[redacted]	110*
Overall Clear pass %	100%	[redacted]	100%
Overall average marks	63.09%	[redacted]	62.29%

* ONE STUDENT ABSENT

Dr. V.K. Saini
HOD,ME

ODD SEM-

DEPARTMENT OF MECHANICAL ENGINEERING

Result Analysis for B.Tech ME1 2ND Year, Odd Sem. Session (2019-20)

Subject	Session:2017-18				Session:2018-19				Session:2019-20				Diff with 17-18	Diff with 18-19	Result pending
	Average %	Students	Pass %	CP	Average %	Students	Pass %	CP	Average %	Students	Pass %	CP			
RVE 301(Human Values)	54.41	54	98.14	1	50.71	35	100	0							
KME 038(Electronics Engineering)									45.08	51	89.8	5			2
KAS301(Technical Communication)									47.63	51	97.95	1			2
ROE 033 /Laser	59.26	54	98.14	1	56.57	35	94.28	1							
RCT-303/KME 302 (Fluid Mech)	55.34	54	96.29	2	45.00	35	85.71	5	49.87	51	85.71	7	-5.47	4.87	2
RME 301/KME 303 (Material Sc)	57.86	54	100	0	45.28	35	88.57	4	48.33	51	95.92	2	-9.53	3.05	2
RME 302/ KME 301 (Thermodynamics)	53.60	54	94.44	3	49.42	35	97.14	1	44.58	51	85.71	7	-9.02	-4.84	2
RME 303/ NME 304 (SOM)	57.51	54	92.59	4	35.71	35	82.85	7							
Average - Class	56.33				47.12				47.08						
Clear pass %	85.19%				65.71%				69.38%						

Subject	Average	Faculty
RVE 301(Human Values)		
KME038(Electronics Engineering)	45.08	Mr. V K AGGARWAL
KAS301(Technical Communication)	47.63	Dr. ARVIND KR SHARMA
RCT-303/KME 302 (Fluid Mech)	49.87	Mr. A S PARMAR
RME 301/KME 303 (Material Sc)	48.33	Dr. B.N. PATHAK
RME 302/ KME 301 (Thermodynamics)	44.51	Dr. S K KALLA
RME 303/ NME 304 (SOM)		

Overall Result 2nd year	2017-18	2018-19	2018-19
Total No. of Students in IInd Year	111	70	51
Total no. of Students clear pass	96	89	34
Overall Clear pass %	86.49	62.85	69.38
Overall % average marks	56.48	48.29	47.08

HOD, ME

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DEPARTMENT OF MECHANICAL ENGINEERING

Result Analysis for B.Tech ME2, 4th Year, Odd Sem. Session (2019-20)

Subject	Session:2017-18				Session:2018-19				Session:2019-20				Difference w.r.t 2018-19	Difference w.r.t 2017-18
	Average %	Students	Pass %	CP	Average %	Students	Pass %	CP	Average %	Students	Pass %	CP		
RCE-471/RCE-474 UHBC	58.95	60	100	Nil	58	56	100	0	57.34	56	100	NIL	-5.70	-8.30
EME/RME-432 CAM	NOT OPTED BY STUDENTS				55.62	34	97.06	1	N.A.					
RME-432 Project Mangt.	61.50	60	100	Nil	65.18	22	100	0	N.A.					
EME/RME-041 TQM	57.80	60	98	1	58.29	29	100	0	N.A.					
RME-475 Operation Research	N.A.				N.A.				58.91	27	100	NIL		
RME-044/RME078 Auto and Robot	NOT OPTED BY STUDENTS				60.37	27	100	0	56.94	29	100	NIL	-3.43	
RME-701 CAD/RME-701 CAD/CAM	58.63	60	98	1	53.93	56	96.43	2	55.09	56	100	NIL	1.16	1.46
RME-471 Power Plant	N.A.				N.A.				53.99	37	100	NIL		
RME072 Supply Chain	N.A.				N.A.				59.90	19	100	NIL		
RME-702/RME-702 Automobile Engg	58.02	60	100	Nil	55.27	56	100	0	56.77	56	100	1**	1.50	-1.25
Average - Class	57.82				57.52				56.99					
No. of Carry over				2				3				1**		
Clear pass %	96.67%				94.64%				98.21%					

1** Absent

Session:2019-20

SUBJECT	AVG.	PASS %	FACULTY NAME
RCE-471/RCE-474 UHBC	57.34	100	Mr. Shivom Sharma
RME-475 Operation Research	58.91	100	Mr. Ankit Kumar Saxena
RME-044/RME078 Auto and Robot	56.94	100	Mr. Sumit Sharma
RME-701 CAD/RME-701 CAD/CAM	55.09	100	Dr. Pankul Goel
RME-471 Power Plant	53.99	100	Dr. Pankul Goel
RME-072 Supply Chain	59.90	100	Mr. O P Umrao
RME-702/RME-702 Automobile Engg	56.77	100	Mr. V.K. Jain
CLASS AVERAGE	56.99	98.21	

Overall Result Analysis for B.Tech ME 4th Year, Odd Sem. Session (2019-20)

Overall Result 4th year	2017-18	2018-19	2019-20
Total No. of Students in IV th Year	178	164	111
Total No. of Students clear pass	174	157	108
Overall Clear pass %	97.75	95.73	97.30
Overall average marks	57.85	57.85	57.82

Dr. V.K. Saini
HOD,ME

Department of Mechanical Engineering

Subject Name: Automation & Robotics **Subject Code: NME-044**

Year: 4th **Section: ME-1**

SNO	Roll No	Name	CT1	CT2	PUT	Remark
1	1514340003	ABHIJEET KUMAR MISHRA	12	AB	62.5	
2	1514340005	ABHISHEK GUPTA	22	AB	73.5	
3	1514340008	ABHISHEK KUMAR	20	AB	61.5	
4	1514340010	ABHISHEK NANDAN	18	AB	34	UFM
5	1514340011	ABHISHEK SINGH	13	D	40	
6	1514340012	ABHISHEK TYAGI	19	AB	40	
7	1514340016	AKASH GOEL	AB	AB	74.5	
8	1514340019	AMAN MISHRA	23	AB	82	
9	1514340022	AMAY TIWARI	20	D	53.5	
10	1514340025	ANAND KUMAR	19	AB	64	
11	1514340031	ANKIT CHANDEL	6	D	33	Not written in copy
12	1514340032	ANKIT KR. CHATURVEDI	24	D	46	
13	1514340036	ANURAG DIWAKAR	24	AB	60.5	
14	1514340040	ARPIT SACHAN	19	D	45	
15	1514340044	AVISHA SAXENA	20	AB	46	
16	1514340045	BHANU PRAKASH YADAV	14	25	55	
17	1514340046	BHARAT BHARADWAJ	18	D	36	Not written in copy
18	1514340052	DHRUV PANDEY	20	D	40	
19	1514340054	GAGAN KUMAR	23	AB	62	
20	1514340057	GOVIND SINGH	21	AB	26.5	Not written in copy
21	1514340062	HARSHIT SRIVASTAVA	17	D	51	
22	1514340072	KASHAN ZARTAB	18	AB	50.5	
23	1514340073	KM RAKHI	24	AB	56	
24	1514340078	MILIND CHAUHAN	13	AB	41.5	
25	1514340079	MOHAMMAD AADIL	16	D	54	
26	1514340087	NEERAJ KUMAR	14	AB	67.5	
27	1514340088	NIDHI SINGH	17	AB	61.5	

Result Analysis

	CT-1	CT-2	PUT
Number of Students in Section	27	27	27
Number of Students Present	26	1	27
Total Pass students	25	1	23
Pass %(≥40%)	96.15	100	85
Average Marks	18.23	25	53
Highest Marks	24	25	82

Mubina Shekh

(Name & sign of Subject Teacher)

(HOD ---) 04.12.18

4/12/18

Department of Mechanical Engineering

Subject Name: Automation & Robotics **Subject Code: NME-044**

Year: 4th **Section: 2ME**

SNO	Roll No	Name	CT1	CT2	PUT	Remark
1	1514340050	DEEPANSHU SHARMA	25	AB	66	
2	1514340075	MANEESH YADAV	21	D	44.5	
3	1514340077	MAYANK PANDEY	20	AB	54	
4	1514340081	MOHD ADNAN	22	D	48	
5	1514340085	MOHIT	20	D	49.5	
6	1514340090	NILESH TIWARI	26	AB	68	
7	1514340092	OM KAR SETH	21	AB	59	
8	1514340094	PIYUSH GUPTA	19	D	45.5	
9	1514340097	PRADHUMAN SINGH	22	AB	45.5	
10	1514340102	PRATIKSHIT CHAND	23	AB	~~47.5~~ 51	
11	1514340107	PRIYANSHU KUMAR RAJPUT	AB	D	33	Not attempted all questions
12	1514340112	RAHUL SHUKLA	25	AB	71	
13	1514340123	RITESH KUMAR CHATURVEDI	23	AB	69	
14	1514340126	SACHIN GAUTAM	26	AB	74	
15	1514340132	SARFULLAH ANSARI	AB	D	58	
16	1514340152	SHUBHAM SHARMA	24	AB	68	
17	1514340172	VINAY KUMAR CHAUDHARY	AB	AB	53	
18	1514340177	VIPUL KUMAR	22	AB	74	
19	1514340180	VIVEK KUMAR SINGH	17	AB	45.5	
20	1514340184	YOGENDRA KUMAR	23	AB	55.5	

Result Analysis

	CT-1	CT-2	PUT
Number of Students in Section	20	20	20
Number of Students Present	17	0	20
Total Pass students	17	NA	19
Pass %(≥40%)	100	NA	95
Average Marks	22.29	NA	56
Highest Marks	26	NA	74

Mubina Shelch

(Name & sign of Subject Teacher)

(HOD ---) 4.12.18

4/12/18

ME-1 THIRD YEAR (2019-20)
RESULT ANALYSIS
MACHINE DESIGN-I [RME-501]

S.NO	ROLL NO	NAME	CT-1	CT-2	PUT
1	1714340001	AADITYA DHIMAN	16		44
2	1714340002	ABHINAV BISWAS	6		29
3	1714340003	ABHINAV PRATAP SINGH	8		34
4	1714340004	ABHISHEK SINGH	18		28
5	1714340006	ADARSH PATEL	25		52
6	1714340007	ADITYA KUMAR SINGH	21		42
7	1714340008	AMAN SINGH	23		29
8	1714340009	ANANT PRATAP RANA	12		28
9	1714340010	ANKIT SINGH	17		36
10	1714340011	ANSHUL SAINI	20		19
11	1714340012	ANUJ KUMAR	4	23	34
12	1714340013	ANURAG KUSHWAHA	12		28
13	1714340014	AQEEL NAQVI	17		28
14	1714340015	ARIHANT MISHRA	29		40
15	1714340016	ASHISH TYAGI	20		28
16	1714340017	ASHIT BHARGAVA	23		28
17	1714340018	ASHUTOSH KUSHWAHA	22		39
18	1714340019	ASHUTOSH MISHRA	5	7.5	28
19	1714340020	ASHUTOSH SHARMA	20		40
20	1714340021	AVIRAL GUPTA	20		33
21	1714340022	AYUSH MISHRA	12		17
22	1714340023	AYUSH SINGH	1		7
23	1714340024	BADRUZZAMA	24		35
24	1714340025	CHITRANSH SHARMA	21		31
25	1714340026	DEEPANSHU CHAUHAN	17		28
26	1714340027	DEEPANSHU KUMAR	0		12
27	1714340028	DIWANSHU SHARMA	28		57
28	1714340029	HARSH KUMAR	14		28
29	1714340030	HIMANSHU SHARMA	12		28
30	1714340031	HIMENDRA PANDEY	9	14	29
31	1714340032	JATIN DWIVEDI	16		14
32	1714340033	MANOJ KUMAR	20		20
33	1714340034	MAYANK GAUTAM	16		31
34	1714340035	MIRZA SUHAIB BEG	3		10
35	1714340036	MUHAMMAD AHMAD	3		14

CRITERIA	CT-1	CT-2	PUT
TOTAL NO. OF STUDENT	35	35	35
NO. OF DETAINED	Nil	Nil	Nil
AVERAGE MARKS	15.25	14.83	29.37
NO. OF FAIL	9	1	8
ABESNT	Nil	32	Nil
PRESENT	35	3	35
PASS %	74.28	66.66	77.14
HIGHEST MARKS	29	27	57
MINIMUM MARKS	0	7.5	7

Subject Teacher

HOD,ME

ME-2 THIRD YEAR (2019-20)
RESULT ANALYSIS
SOCIOLOGY [RAS-501]

S.NO	ROLL NO	NAME	CT-1	CT-2	PUT
1	1714340037	NELSAN MANDELA	7		32
2	1714340038	NITESH RAGHAV	22		31
3	1714340039	NITIN KUMAR SHARMA	18		45
4	1714340041	PARAMJEET SINGH GILL	17		34
5	1714340042	PAWAN KUMAR	11	15	51
6	1714340043	PIYUSH KUMAR SINGH	AB	9	26
7	1714340044	PRADHUM NIRANJAN	17	24	60
8	1714340045	PRAKHAR GUPTA	21		62
9	1714340046	PRANAV SINGH	25	16	51
10	1714340047	PRANV TYAGI	24		52
11	1714340048	PRASHANT KUMAR SHARMA	21		40
12	1714340049	RAKESH KUMAR YADAV	22		50
13	1714340050	RAVI SHANKAR	21		50
14	1714340052	RITIK PATHAK	20		44.5
15	1714340053	SAHIL VASHISHTH	AB	23	62
16	1714340054	SANDEEP KUMAR SINGH	23		46
17	1714340055	SATYENDRA RAJPOOT	19		31
18	1714340056	SAURABH KUMAR	24		38
19	1714340057	SHIVA SHARMA	12		47
20	1714340058	SHIVAM .	21		50
21	1714340059	SHIVAM MITTAL	23		51
22	1714340061	SHIVAM SHARMA	25		51
23	1714340062	SHIVAM .	AB	13	34
24	1714340063	SHREYA GUPTA	17		41
25	1714340064	SIDDARTHA GUPTA	18		48
26	1714340065	SINGH NANDKISHOR RAJVEER	16		48
27	1714340066	SHUBHAM KUMAR DUBEY	22		54
28	1714340068	SUNNY KUMAR	22	15	61
29	1714340069	TOSHENDU PANDEY	13		21.5
30	1714340070	TUSHAR MALIK	19		40
31	1714340071	UDESH SINGH JASROTIA	18		40.5
32	1714340072	VIKASH KUMAR AGRAHARI	16	18	46
33	1714340074	VIVEK CHAUDHARY	AB	18	50
34	1714340075	YASHPRATAP SINGH CHAUHAN	25	25	62
35	1814340901	SANDEEP CHAUHAN	12		37

CRITERIA	CT-1	CT-2	PUT
TOTAL NO. OF STUDENT	35	35	35
NO. OF DETAINED	Nil	Nil	Nil
AVERAGE MARKS	19.06	17.6	45.35
NO. OF FAIL	2	1	1
ABESNT	4	25	0
PRESENT	31	10	35
PASS %	93.54	88.88	97.14
HIGHEST MARKS	25	25	62
MINIMUM MARKS	7	9	21.5

Subject Teacher

HOD,ME

IMS Engineering College, Ghaziabad
Department of Electronics & Communication Engineering
PUT Result Analysis (Odd Semester 2019-20)

Class: EC1 3rd Year — Sub: Integrated Circuits (REC 501)

S. No.	University Roll	Name	CT-1 Marks (30)	CT-1 Marks (30)	PUT Marks (70)
1	1714331001	ABHISHEK PATEL	12	13	47
2	1714331002	ADARSH KUMAR JHA	12	20	55
3	1714331003	AKSHANSH SINGH	14	AB	35
4	1714331004	AMAN KANSAL	12	3	36
5	1714331005	AMAN SINGH ASWAL	13	AB	41
6	1714331006	AMAN DESHWAL	12	AB	23
7	1714331007	AMIT YADAV	12	3	39
8	1714331008	ANJU SINGH	12	AB	30
9	1714331009	ANMOL LATIYAN	7	AB	7
10	1714331010	ANOOP KUMAR MISHRA	8	AB	50
11	1714331011	ANUJ SINGH	8	10	33
12	1714331012	ANUSHK SRIVASTAV	19	AB	37
13	1714331013	ARIHANT JAIN	AB	AB	32
14	1714331014	ASHISH KUMAR DUBEY	15	24	55
15	1714331015	ATUL KUMAR	AB	AB	5
16	1714331016	AYUSH AWASTHI	12	16	35
17	1714331017	CHAKSHU PARASHAR	10	AB	18
18	1714331018	GAURAV THAPLIYAL	0	3	10
19	1714331019	HARSHIT TOMAR	13	AB	28
20	1714331020	HIMANSHU GANGWAR	5	AB	10
21	1714331021	JANMEJAY SINGH CHAUHAN	21	AB	35
22	1714331022	JAYDEEP AGARWAL	23	AB	67
23	1714331023	KARAN SHARMA	13	23	47
24	1714331024	KARTIK SINGHAL	2	2	22
25	1714331025	KM. SHIVANGI AGRAWAL	26	AB	56
26	1714331026	KRISHNA MURARI RAI	5	7	34
27	1714331027	KULDEEP SINGH	12	AB	37
28	1714331029	MEGHA VISHWAKARMA	21	AB	28
29	1714331030	MUDIT GARG	8	AB	40
30	1714331031	MUKUL SINGH SISODIA	4	10	25
31	1714331032	NEERAJ KUMAR	12	AB	33
32	1714331034	NISHI GUPTA	28	AB	48
33	1714331035	NITIN KUMAR YADAV	4	4	16
34	1714331038	PIYUSH KUMAR SINGH	18	AB	39
35	1714331075	YATI SHINGAL	28	23	65

Number of Students in Section	35	35	35
Number of Students Present	33	14	35
No. of Students below 40%	11	8	9
Pass % (≥40%)	66.67%	42.85%	74.29%
Average Marks	12.43	11.5	34.8
Highest Marks Obtained	28	24	67

(Subject Teacher)
Mr. Praveen Kumar

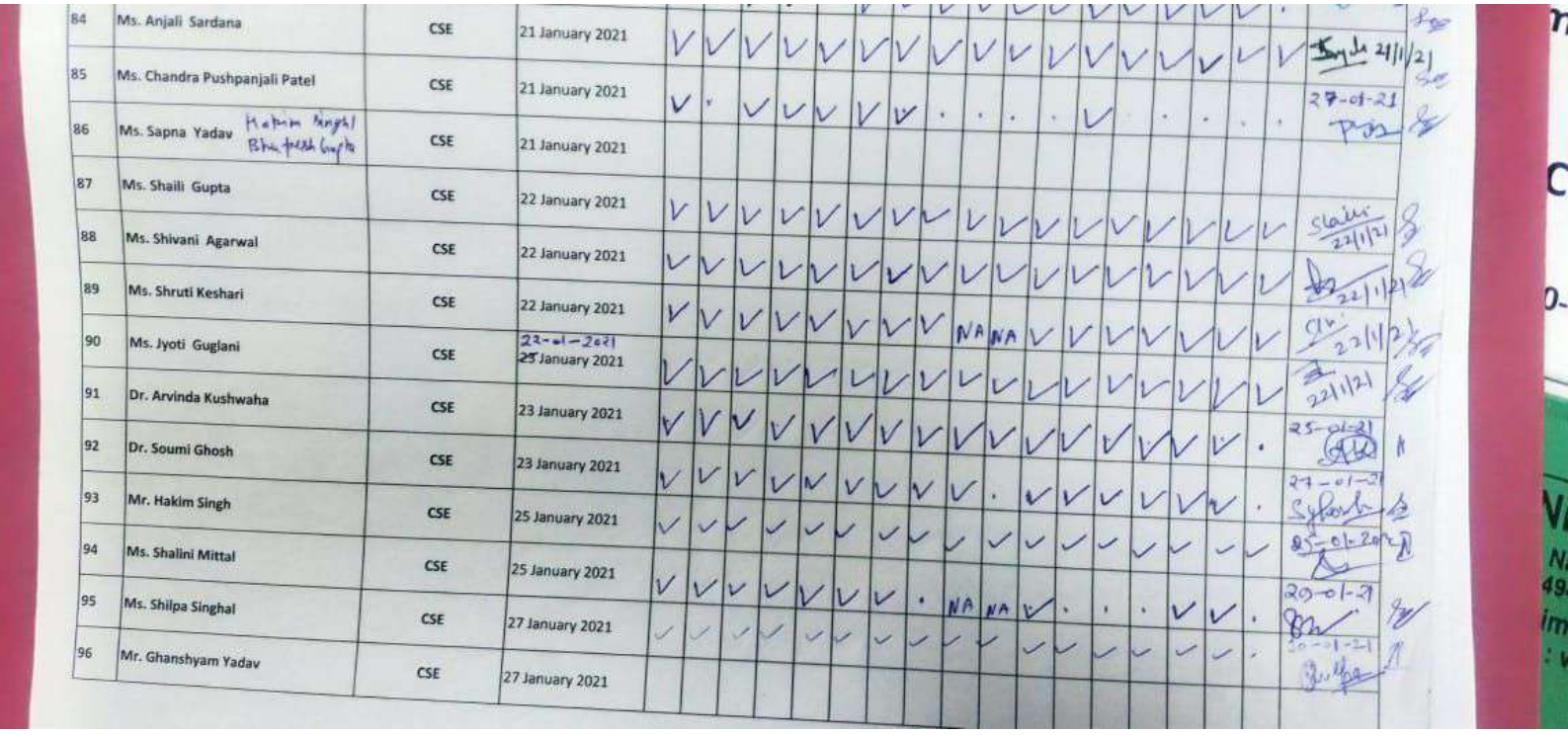
(HoD/ECE)
Prof. (Dr.) R.P.S Chauhan 02/12/19

Course File Audit

S. No	Name	Department	Date of Audit	Mission/Vision (Institute/Department)	PO/PEO/PSO	Academic calender	Time Table	Student List	Univ Eval Scheme	Theory Syllabus	CO-PO/PSO Mapping	Practical Syllabus	List of Experiment with mapped CO	Beyond Syllabus	Quiz/Assignment/Tutorial Record	CT Question Paper	Marks Analysis	Lecture Notes	AKTU (3 yrs) Question Paper with Solution	Attendance register	Signature of Faculty
1	Dr. Manoj kumar Singh	AS&H	27 January 2021																		
2	Dr. Neetu Goel	AS&H	16 January 2021																		
3	Dr. Arvind Kumar Sharma	AS&H	16 January 2021																		
4	Dr. Chetana Sharma	AS&H	16 January 2021																		
5	Dr. K V V N S Sundari Kameswari	AS&H	18 January 2021																		
6	Dr. Mohit Rastogi	AS&H	18 January 2021																		
7	Dr. Rahul Kumar Pandey	AS&H	19 January 2021	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓	19/1/21
8	Dr. Raza Rasool	AS&H	19 January 2021																		
9	Dr. Suman Gupta	AS&H	22 January 2021	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓	25-01-21
10	Dr. Vikram Singh	AS&H	22 January 2021																		
11	Mr. Hari Shanker	AS&H	22 January 2021																		

50	Mr. Saroj Kumar	EN	28 January 2021	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
51	Mr. Umang Sharma	EN	28 January 2021																	
52	Mr. Varun Kumar Singhal	EN	23-01-2021 28 January 2021	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
53	Mr. Vijay Kumar	EN	22-01-2021 29 January 2021	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
54	Ms. Snigdha Chaturvedi	EN	29 January 2021	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
55	Dr. Vinod Kumar Saini	ME	27 January 2021	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
56	Dr. Bibeka Nand Pathak	ME	19 January 2021	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
57	Dr. Pankul Goel	ME	19 January 2021																	
58	Mr. Om Prakash Umrao	ME	19 January 2021	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
59	Mr. Abhishek Saxena	ME	21 January 2021	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
60	Mr. Ajay Singh Parmar	ME	21 January 2021	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
61	Mr. Ankit Kumar Saxena	ME	21 January 2021	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
62	Mr. Gaurav Kumar Mishra	ME	21 January 2021																	

33	Ms. Punjika Rathi	MBA	23 January 2021																				
34	Dr. R P S Chauhan	ECE	28 January 2021																				
35	Mr. Balwant Singh	ECE	16 January 2021	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	19.1.21	
36	Mr. Jaya Nidhi Vashishtha	ECE	16 January 2021	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	20/01/21	
37	Dr. Neeraj Jain	ECE	16 January 2021	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	28/01/21	
38	Mr. Pankaj Goel	ECE	20 January 2021	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	25/01/21	
39	Mr. Praveen Chaurasia	ECE	20 January 2021	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	20/01/21	
40	Mr. Praveen Kumar	ECE	20 January 2021	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
41	Mr. V K Agrawal	ECE	27 January 2021																				
42	Ms. Mayurika Saxena	ECE	27 January 2021																				
43	Ms. Sulekha Saxena	ECE	21-01-2021 ~~27~~ January 2021	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Sulekha 21-01-21	
44	Dr. Rajeev Kumar Chauhan	EN	18 January 2021																				
45	Mr. Atul Kumar Kushwaha	EN	18 January 2021	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	18/01/21	



84	Ms. Anjali Sardana	CSE	21 January 2021	
85	Ms. Chandra Pushpanjali Patel	CSE	21 January 2021	
86	Ms. Sapna Yadav Hakim Singh/ Bhupendra Gupta	CSE	21 January 2021	
87	Ms. Shaili Gupta	CSE	22 January 2021	
88	Ms. Shivani Agarwal	CSE	22 January 2021	
89	Ms. Shruti Keshari	CSE	22 January 2021	
90	Ms. Jyoti Guglani	CSE	22-01-2021 ~~25~~ January 2021	
91	Dr. Arvinda Kushwaha	CSE	23 January 2021	
92	Dr. Soumi Ghosh	CSE	23 January 2021	
93	Mr. Hakim Singh	CSE	25 January 2021	
94	Ms. Shalini Mittal	CSE	25 January 2021	
95	Ms. Shilpa Singhal	CSE	27 January 2021	
96	Mr. Ghanshyam Yadav	CSE	27 January 2021	

99	Ms. Megha Gupta	CSE	28 January 2021	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
100	Dr. Siddhi Nath Rajan	IT	28 January 2021	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
101	Mr. Neeraj Kumar Sirohi	IT	18 January 2021	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
102	Mr. Ajay Kumar Sahu	IT	19 January 2021	✓	✓	✓	✓	✓	✓	✓	✓	✓	•	✓	✓	✓	✓	✓	✓	•
103	Mr. Amit Kumar Singh Sanger	IT	16 January 2021																	
104	Mr. Deepak Vishwakarma	IT	20 January 2021	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
105	Mr. Ravi Shankar Pal	IT	21 January 2021	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
106	Mr. Shardul Singh Chauhan	IT	22 January 2021	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
107	Mr. Sherish Johri	IT	22 January 2021																	
108	Mr. Updesh Kumar Jaiswal	IT	23 January 2021	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	✓	✓	✓
109	Mr. Upendra Mishra	IT	25 January 2021																	
110	Mr. Veer Bhadra Pratap Singh	IT	27 January 2021																	
111	Ms. Pragya	IT	27 January 2021	✓	✓	✓	✓	✓	✓	✓	✓	NA	N.A	NA	NA	✓	✓	✓	✓	✓
112	Mr. Manoj Kumar	IT	29 January 2021	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

67	Mr. Vivek Kumar Jain	ME	29 January 2021																			
68	Ms. Mubina Shekh	ME	29 January 2021	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	29/01/21
69	Mr. Radha Raman Jha	CE	27-01-2021 ~~22~~ January 2021	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	.	.	—	
70	Ms. Suman Lata Verma	CE	22 January 2021	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	27-01-21
71	Ms. Vidushi Chauhan (recheck the website title)	CE	22 January 2021	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	?	?	27-01-21
72	Dr. Pankaj Aggarwal	CSE	28 January 2021	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
73	Dr. Suveg Moudgil	CSE	16 January 2021	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	25-01-21
74	Dr. Upasana Pandey	CSE	16 January 2021	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	28/1/21
75	Mr. Atul Kumar	CSE	27 ~~18~~ January 2021																			
76	Mr. Nizam Uddin Khan	CSE	18 January 2021	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
77	Dr. Suneet Shukla	CSE	26 ~~18~~ January 2021	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
78	Mr. Atul Kumar Singh (constraint leave)	CSE	19 January 2021																			
79	Mr. Bhupesh Kumar Gupta	CSE	13 ~~19~~ January 2021	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	.	.	.	.	

CT-1 Paper KEE061(Special Electrical Machines)

* Required

1. Email *

2. Name of Student *

3. Roll No. of Student *

Section A (Objective Question)

4. 1. For which of the applications a reluctance motor is preferred 1 point

Mark only one oval.

- A.Electric shavers
- B.Refrigerators
- C.Singnalling and timing devices
- D.Lifts and hoists

5. 2. Reluctance motors are 1 point

Mark only one oval.

- A.Singly excited
- B.Doubly excited
- C.Either of the above
- D.None of the above

6. 3. Which of the following motors is generally used in toys 1 point

Mark only one oval.

- A.Reluctance motor
- B.Hysteresis motor
- C.Shaded-pole motor
- D.Two-value capacitor motor

7. 4. In a hysteresis motor, the rotor 1 point

Mark only one oval.

- A.Has high hysteresis loss
- B.Has high retentivity
- C.Is made of chrome steel
- D.Should have all of the above features

8. 5. The direction of rotation of a hysteresis motor is determined by the 1 point

Mark only one oval.

- A.Retentivity of the rotor material
- B.Amount of hysteresis loss
- C.Permeability of rotor material
- D.Position of shaded pole with respect to the main pole

9. 6. Which of the following applications make use of a universal motor 1 point

Mark only one oval.

- A.Portable tools
- B.Lathe machines
- C.Oil expeller
- D.Floor polishing machine

10. 7. An outstanding feature of a universal motor is its 1 point

Mark only one oval.

- A.Best performance at 50 Hz supply
- B.Slow speed at all loads
- C.Excellent performance on dc. supply
- D.Highest output kW/kg ratio

11. 8. A repulsion motor is equipped with 1 point

Mark only one oval.

- A.Slip rings
- B.Commutator
- C.Both (a) and (b)
- D.None of the above

12. 9. A repulsion-start induction-run single-phase motor runs as induction motor only when 1 point

Mark only one oval.

- A.Short-circuiter is disconnected
- B.Stator winding is reversed
- C.Brushes are shifted to neutral plane
- D.Commutator segments are short-circuited

13. 10. A.C. servomotor resembles 1 point

Mark only one oval.

- (A) Two phase induction motor
- (B) Three phase induction motor
- (C) Direct current series motor
- (D) Universal motor

Section B

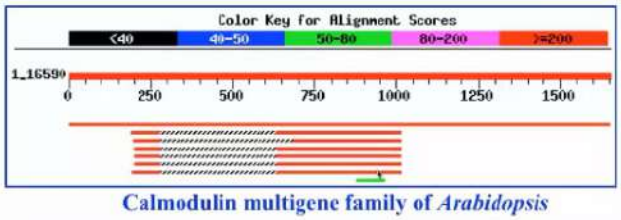
Attempt All Questions 4 Marks Each.

14. 20 points

1. A motor generator set used for providing variable frequency ac supply consists of a 4 pole 3-φ synchronous motor and 48 pole 3 φ synchronous generator. The motor generator set is fed from 5 Hz, 3φ ac supply. A 4 pole 3 φ induction-motor is electrically connected to the terminals of the synchronous generator and runs at a slip of 2%. Find
   (i) the frequency of generated voltage of synchronous generator
   (ii) the speed at which induction motor is running
   (iii) frequency of rotor current of Induction motor
2. Explain the construction and working of repulsion motor.
3. Discuss the construction and working of reluctance motor.
4. Explain the construction and working of Hysteresis motor.
5. Discuss the construction and working principle of LIM.

Files submitted:

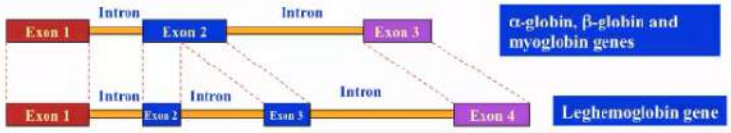
Gene families and superfamilies



Calmodulin multigene family of *Arabidopsis*

The *Arabidopsis* genome contains seven genes encoding calmodulin, one on chromosome 5 and two each on chromosome 1, 2 and 3.

- **Superfamily:** A set of multi-gene families all originated from a common ancestor.
- **Globin Superfamily:** α-globin, β-globin, myoglobin and leghemoglobin gene families.



52:09

K.C. Upadhyaya (Guest)

KU

K.C. Upadhyaya (Guest)

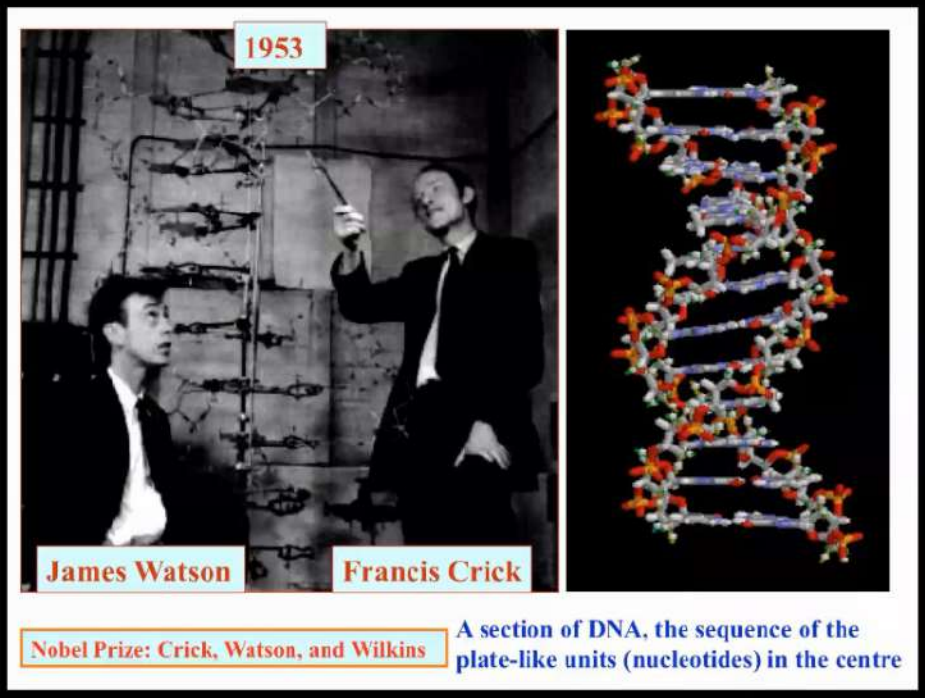
People

Invite someone

Share invite

Currently in this meeting (75) Mute all

- Priya Ranjan Kumar — Organiser
- AAYUSHI SAINI
- Abhidha Kohli
- ABHIJEET SINGH
- ABHINAV ROHILA
- ABHISHEK GAUR
- ADITYA RAJ
- AKANKSHA SINGH
- AKASH PANDEY
- ANJALI GUPTA
- ANSHIKA PARMAR
- ANSHU NEHRA



Nobel Prize: Crick, Watson, and Wilkins

A section of DNA, the sequence of the plate-like units (nucleotides) in the centre

People

Invite someone

Share invite

Currently in this meeting (75) Mute all

- PK Priya Ranjan Kumar — Organiser
- AAYUSHI SAINI
- AK Abhidha Kohli
- ABHIJEET SINGH
- ABHINAV ROHILA
- AO ABHISHEK ORIL
- AR ADITYA RAJ
- AKANKSHA SINGH
- AKASH PANDEY
- ANJALI GUPTA
- ANSHIKA PARMAR
- ANSHITA CHAUDHARY

INDERPRASTHA ENGINEERING COLLEGE GHAZIABAD

P-63, Site IV, Industrial Area, Sahibabad, Ghaziabad, Uttar Pradesh-201010

3- Day Online Faculty Development Program on "Digital & Analog IC Design Using Cadence Virtuoso"

CERTIFICATE OF PARTICIPATION

This is to certify that

VIJAY KUMAR

from **IMSEC Ghaziabad** has successfully attended the Faculty Development Program on the topic **"Digital & Analog IC Design Using Cadence Virtuoso"** organized by the **Department of Electronics & Communication Engineering, Inderprastha Engineering College, Ghaziabad** from **August 24 to 26, 2020.**

MS. MEENAKSHI SHARMA
(CONVENER)

DR. V. K GUPTA
(HOD ECE)

DR. B. C. SHARMA
(DIRECTOR)

Faculty
Development
Program

RAMA UNIVERSITY
www.ramauniversity.ac.in

CERTIFICATE OF PARTICIPATION

This is to certify that

Dr./Mr./Ms./Mrs. Dr. Bibeka Nand Pathak has participated

in the one week "Online Faculty Development Program" on "Emerging Trends, Issues and Challenges in Next-Generation Technology" organized by Faculty of Engineering and Technology Rama University, Kanpur from 20th - 24th July 2020.

Dr. Janardhana Amaranath B.J.	Dr. Hari Om Sharan	Mr. Amit Kumar Singh
Vice-Chancellor	Dean	Convener

Verified
Certificate

Alex Aklson
Ph.D., Data Scientist
IBM

This is to certify that

Saroj Kumar

successfully completed and received a passing grade in

DS0101EN: Introduction to Data Science

a course of study offered by IBM, an online learning initiative of IBM.

Verified Certificate
Issued February 24, 2021

Valid Certificate ID
900d9eaf1a4f48829cb4f248fe516a27

Verified
Certificate

IBM

Joseph Santarcangelo
Data Scientist
IBM

This is to certify that

Saroj Kumar

successfully completed and received a passing grade in

PY0101EN: Python Basics for Data Science

a course of study offered by IBM, an online learning initiative of IBM.

edX

Verified Certificate
Issued April 21, 2021

Valid Certificate ID
6065f5547a8847f897a3b3e9889b6864

INDERPRASTHA ENGINEERING COLLEGE GHAZIABAD

P-63, Site IV, Industrial Area, Sahibabad, Ghaziabad, Uttar Pradesh-201010

3- Day Online Faculty Development Program on "Digital & Analog IC Design Using Cadence Virtuoso"

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MS. MEENAKSHI SHARMA
(CONVENER)

DR. V. K GUPTA
(HOD ECE)

DR. B. C. SHARMA
(DIRECTOR)

Faculty
Development
Program

RAMA UNIVERSITY
www.ramauniversity.ac.in

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Vice-Chancellor	Dean	Convener

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Verified Certificate
Issued February 24, 2021

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Verified
Certificate

IBM

Joseph Santarcangelo
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IBM

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Issued April 21, 2021

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