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Dietary habits and atherogenic factors of cardiovascular disease patients in Jabalpur city

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Abstract
Background: Good health is a major resource of the quality of life. But in present time's life style changes and dietary pattern stemming from rapid modernization increases the occurrence of degenerative diseases mainly cardiovascular disease and India ranks seconds in heart attacks.
Objective: To find out the dietary habits and atherogenic factors of cardiovascular disease patients of Jabalpur city.
Material and Methods: Randomly selected 100 newly diagnosed cardio vascular disease patients and 50 healthy person"s demographic, dietary assessments and serum lipid profiles were collected from the questionnaire and patient reports.
Results: Males (78%) are more vulnerable than female (22%) of 40 to 49 age group. Most of the patients are non-vegetarians (53%), belonging to upper middle socio economic class (47%), increased BMI level (40%), no physical activity (55%) and higher intake of addictions (25%). Mean scores of dietary cholesterol, fat and calories intake, serum cholesterol, triglyceride; LDL cholesterol level was higher in Cardio vascular disease patient's than healthy persons.
Conclusions: Life style and dietary modification is needed to reduce the risk of cardio vascular disease.

Keywords: cardio vascular diseases, atherogenic factors, lifestyle

1. Introduction
Cardiovascular diseases are at present the leading cause of death in developed countries. Ischemic heart disease is the cause of 25 - 30% of death in most industrialized countries [1]. It is predicted that cardio vascular disease will surpass infectious diseases as the world's number one cause of death and disability [6]. Worldwide Cardio vascular disease is a major health burden. Cardiovascular Diseases (CVD) are the leading cause of morbidity and mortality in several countries and responsible for about 17 million deaths in 2011 [19].
CVD are also the leading cause of mortality and represent the second leading cause of hospitalization among adults over age 20 years. In India, coronary heart disease accounts for 10 to 15 percent of all cardio vascular disease. The best combination of the several known standard risk factors (i. e. increasing age, gender, elevated blood pressure, raised serum cholesterol, cigarette smoking, obesity, diabetes, family history of coronary heart disease etc.) extreme competitiveness, impatience, aggressiveness and hostility combined with time urgency and excessive involvement with work has been linked with coronary heart disease [2].
Good health is a major and important element of the quality of life but in present times change in life style and dietary pattern stemming from rapid modernization have flavored and increase in the occurrence of non- communicable degenerative diet related diseases among which cardio vascular disease occupy a primary place [4].
The quantity and quality of dietary fat alter serum lipid fractions, which in turn plays an important role in etiology of cardio vascular diseases. Recently, several studies have reported the impact of dietary indexes on the risk of cardio vascular diseases or total mortality. These indexes are based on general dietary recommendations [9, 18]. To a lesser extent, studies have investigated the relation of dietary patterns that reflect existing eating habits to mortality from Cardio vascular diseases [16]. Although, this work has been conducted to analyze all possible risk factors of cardio vascular disease.

2. Material and Methods
2.1 Sampling of Population
The study was conducted on 100 recently diagnosed cardio vascular disease patient from different hospitals of Jabalpur and 50 persons as a control group between the ages of 20 onwards.

2.2 Collection of Data
A predesigned questionnaire was used for collection of data. The questionnaire included information regarding Age, socio economic status, anthropometric measurements, food habits, dietary assessment, addictions, type of exercise and biochemical parameter of which includes serum lipid profile. Socio economic status was assessed by using the scale developed by Kapoor and Singh [8]. Food habits include vegetarian, non-vegetarian and ova vegetarian. A 7-day food diary method was used to assess the daily nutrient intake. Addictions were grouped according to criteria used by Khare and Shrivastava. The serum lipid parameters were collected from the hospital records.

2.3 Statistical Analysis
Statistical analysis was done using statistical package for the social sciences (SPSS) 16.0 version. All the values were expressed as percentage, correlation and independent t-test. Statistical significance level was considered to be present when the two-tailed probability was less than 0.05. and 0.01 level.

3. Results and Discussion
Table no. 1 shows that in experimental group out of 100 cases 78% were male and 22% are females. Thus the male female ratio in this study was 3.5: 1. In control group consisted of 50 cases

90% were male and 10% female. The highest percentages of cardiac patient were found to be at the age 40-49 years 43% followed by 34%in the age of 50 onwards. *Mosca* [14] also observed that the incidence of cardio vascular disease was more in males than female. Similarly *Heron* [7] found that 70% and 89% of sudden cardiac events occur in men.

Table 2, shows that 47% patients belonged to middle upper class among experimental group, and 22%, 21% belonged to lower middle, upper class respectively.

Table 3, shows that 36% vegetarian, 53% non-vegetarian and 11% ova vegetarian in experimental group and in control group 76% vegetarian, 14% non-vegetarian and 10% ova vegetarian. Shridher *et al.* [11] found beneficial association of vegetarian diet and cardio vascular risk factors compared to non-vegetarian.

Table 4 represent that in control group 60%, 26% and 14% people belong to daily, weekly and non-type of exercise and in experimental group 21%, 24% and 55% people belong to weekly, occasionally and non-type of exercise. Adamu *et al.* [1] concluded that physical inactivity considered a risk factor for cardio vascular disease. Physical activity reduces cardio vascular risk through lowering blood pressure; improve glucose tolerance, reduced obesity and improvement in lipid profile.

Table 5 shows that the highest percentage of stress mainly financial stress found in service man (56%) in the control group and occupational stress found in professionals (39%) in experimental group.

Table 6 shows that the main addiction which has been found tobacco chewing (TC), Betal (B), smoking (SM) and Alcohol (AL), the highest 25% were having addiction in experimental group and in control group 32% having addiction. These results are similar to the findings mentioned in Report on oral tobacco use and its implication in South East Asia by WHO [19]. Raibhoge and Barge [3] also shows that tobacco consumption had significant association with cardio vascular disease.

Table 7 shows that 14% subject in control group and 16% subject in experimental group were underweight, 48% of control group and only 39% of experimental group were found to be healthy. In control group 34% whereas in experimental group 39% subject were normal. In experimental group, 11% and 3% subjects were obese and very obese which was higher than control group. Freiberg *et al.* [13] and Raibhoge and Barge [3] similarly shows that obesity significantly associated with cardio vascular disease.

Table 8 shows that the mean blood pressure in control group was higher in 50 years of age but in experimental group the mean blood pressure was higher in all the age group on both group, the highest mean is blood pressure was found between 20-29 years of age. This result was similar with the study done by Raibhoge and Barge [3].

Table 9 indicates that the atherogenic ratio of control group was comparatively lower than experimental group. In 20-29 years and 30-39 years age group there was non- significance difference between atherogenic ration of experimental and control group. Whereas 40-49 yrs age group the atherogenic ratio was highly significant (P<0.01). Whereas in 50-59 yrs and above 59 years age group the atherogenic ratio was significant (P<0.01).

Table 10 shows the mean scores total serum cholesterol of males was found to be higher in experimental group than the control group. There was highly significant (p<0.01) difference in both groups from normal range. Normal range found in control group 115.45% and 142.13% in experimental group, but in female non-significant difference in control group and in experimental group there is significant difference from normal range. Normal range percentage found in control group 108.08% and 132.10%.

The mean total HDL in males was found to be higher in control group than experimental group. There was highly significant difference (p<0.01) in both groups from normal range. Normal range found in control group 159.31% and 137.40% in experimental group, but in female non - significant difference in both groups, there is significant difference from (p<0.01) from normal range. Normal range found in control group 12.49% and 119.51% in experimental group.

The mean serum triglyceride level in males was found to be higher in experimental group than control group. There was significant difference (p<0.01) in experimental group from normal range (62-200 mg/dl). Normal range found in control group 111.08% and 131.12% in experimental group but in females non – significant difference in control group and significant difference in experimental group from normal range. Normal range found in control group 95% and 137.13% in experimental group.

The mean serum LDL cholesterol level in male was found to be higher in experimental than the control group. There was highly significant difference (p<0.01) in experimental group from normal range (50-160 mg/dl). Normal range found in control group 103.81% and 127.93% in experimental group. Sherpa *et al.* [12] also reported similar observation.

Table 11 shows that the mean calorie intake by male in control group was 2039.21±520.56 Kcal and experimental group was 2610.57± 582.61 there is highly significant difference (p<0.01) in both group. In female there is significant difference (p<0.05) in both group the mean of control group was found to be 1919.82 ± 308.34 Kcal and 2797.60± 663.83 Kcal of experimental group respectively.

The mean protein intake by male in control group is 50.17 ±13.73 gm and in experimental group 65.08±21.43 gm. There is highly significant difference (p<0.01) in both group.

The mean fat intake by male in control group is 59.52 ± 31.88 gm and in experimental group is 86.22 ± 28.94grm. There is highly significant difference (p<0.01) in both group.

The mean carbohydrate intake by male in control group is 263.75 ± 67.86 gm and in experimental group 337.52 ±94.66 gm. There is highly significant difference (p<0.01) in both group.

The mean calcium intake by male in control group 831.26 ± 402.81 mg and in experimental group 698.12 ± 337.06 mg. The calcium intake is higher in control group, but the difference was statistically non -significant. In female calcium intake is higher in control group 995.32±272.6mg and in experimental group 719.85±306.4 mg but the difference was statistically non-significant.

The mean sodium intake by male in control group is 217.15 ± 659.40mg and in experimental group 3077.65± 805.55mg. There is highly significant difference (p<0.01) in both group. In female there is significant difference (p<0.05) between both group. The mean of control group is 2287.53 ± 459.3 mg and in experimental group 3024.08 ±1067.28mg.

The mean fiber intake by male in control group is 42.87 ±22.98 and in experimental group is 29.85±8.26. and in female the mean of control group is 67.92± 8.02 and in experimental group 29.99±4.95. in both groups the difference was not significant.

This result was similar with the study done by Garg *et al.* [5] they observed that the effect of dietary nutrient intake on serum lipid

and liner relationship between calorie, protein, fats and dietary cholesterol and the level of serum cholesterol, LDL and triglycerides.

Table 12 revealed that there is positive correlation between age group and blood pressure in comparison to systolic blood pressure and high degree correlation between diastolic pressure and age group i.e. r=0.871 and 0.798 in experimental group respectively.

Table 13 shows that there is a positive correlation between age and lipid profile in comparison to total cholesterol, triglyceride, HDL and LDL and age. There is high degree correlation r= 0.917, 0.837, 0.896 and 0.865 respectively.

Table 14 shows that there is positive correlation between lipid profile and high blood pressure there was high degree of correlation (r=0.743) between high blood pressure and total cholesterol except other lipid profile.

4. Tables

Table 1: Age and Gender wise distribution in control and experimental group

age	control group n=50)						experimental group(n=100)					
	male(n=45)		female (n=5)		Total (n=50)		male(n=78)		female (n=22)		Total(n=100)	
	no.	%	no.	%	no.	%	no.	%	no.	%	no.	%
20-29	2	4	0	0	2	4	1	1	2	2	3	3
30-39	13	26	0	0	13	26	17	17	3	3	20	20
40-49	24	48	2	4	26	52	34	34	9	9	43	43
50-59	4	8	2	4	4	6	15	15	4	4	19	19
above 59	4	8	2	4	6	12	11	11	4	4	15	15

Table 2: Socio economic status wise distribution of control and experimental group

economic status	% people	
	control group	experimental group
lower	0	2
lower middle	16	22
Middle	0	8
upper middle	70	47
Upper	14	21
Total	100	100

Table 3: Percentage of people according to food habits in control and experimental group

food Habits	control group		experimental group	
	no.	%	No	%
vegetarian	38	76	36	36
non vegetarian	7	14	53	53
ova vegetarian	5	10	11	11
Total	50	100	100	100

Table 4: Physical activity in control and experimental group

Exercise	% control group	% experimental group
Daily	60	0
Weekly	26	21
Occasionally	0	24
Never	14	55
Total	100	100

Table 5: Type of stress in control and experimental group

	financial		Family		occupational		nil	
	control group	experimental group	control group	experimental group	control group	experimental group	control group	experimental group
professionals	0	11	4	9	8	16	4	3
Servicemen	20	16	16	6	8	9	12	0
businessman	0	12	6	2	2	9	20	1
Housewives	0	3	0	3	0	0	0	0
Agriculture	0	0	0	0	0	0	0	0
Total	20	42	26	20	16	34	36	4

Table 6: Percentage of type of addiction in control and experimental group

category of addiction	control group		experimental group	
	No	percentage	no	Percentage
None	16	32	7	7
tobacco chewing (TC)	0	0	1	1
betal(B)	22	44	10	10
smoking(SM)	1	2	4	4
alcohol(AL)	3	6	2	2
TC+SM	3	6	1	1
TC+B	0	0	2	2
TC+AL	0	0	0	0

B+AL	3	6	9	9
B+SM	1	2	6	6
SM+AL	0	0	3	3
TC+B+SM	1	2	9	9
TC+B+AL	0	0	4	4
TC+SM+AL	0	0	5	5
B+AL+SM	0	0	12	12
TC+B+SM+AL	0	0	25	25
Total	50	100%	100	100%

Table 7: Percent distribution of mean BMI in control and experimental group

BMI Grade	control group			experimental group		
	No	%	mean BMI	no	%	mean BMI
Grade I < 19underweight	7	14	18.24	8	8	18.66
Grade II 19.5 to 24.9	23	48	22.67	39	39	22.67
Grade III 25 to 29.9	17	34	27.15	39	39	27.93
Grade IV 30 to 39.9	2	4	30.22	11	11	33.62
Grade V <40	0	0	0	3	3	40.43

Table 8: Mean Scores of age and blood pressure of control and experimental group

Age Group	Blood Pressure (Mean ±SD)			
	control Group		experimental Group	
	Higher	lower	Higher	Lower
20-29	120±14.14	80±0	140±0	81.66± 2.89
30 -39	118.69±11.02	80.53±3.23	133.05±23.92	85.35±10.57
40-49	121.5±7.02	79.96±3.10	130.93±15.73	85.41±9.52
50-59	121.81±7.24	79.81±3.43	13.15±20.49	79±10.37
above 59	131.66±2.89	83.33±2.52	132.66±24.63	85.73±12.23

Table 9: Mean scores of atherogenic ratio in control and experimental group according to age

age group	control Group			experimental Group			t test
	No.	Mean	± SD	No.	Mean	± SD	
20-29	2	2.96	0.48	3	5.41	2.36	1.74
30-39	13	3.57	1.04	20	4.02	1.24	1.12
40-49	26	3.06	1.67	43	4.14	1.69	2.59**
50-59	6	2.51	0.57	19	4.39	1.79	3.98*
above 59	3	2.71	0.56	15	3.97	1.21	2.80*

t= mean difference between control and experimental group
** signiicant at 5%, * significant at 1%

Table 10: Mean scores of lipid profile of male and female in control and experimental group

Lipid Profile	normal Range	control group					experimental group							% normal Range
		Mean	± SD	SE	DF	T	Mean	± SD	SE	DF	t	t_1	Control	experimental
Male														
total cholestero	150-200	202.03	50.21	7.48	44	3.61*	248.73	68.87	7.8	77	9.4	3.9*	115.45	142.13
Triglycerides	60-200	144.4	53.64	8	44	1.8	170.45	93.4	10.58	77	3.8*	1.71	111.08	131.12
HDL	35-55	71.69	21.69	3.23	44	8.25*	61.83	18.76	2.12	77	7.9*	2.6**	159.31	137.4
LDL	50-160	104.68	55.17	8.22	44	0.04	147.87	63.89	7.23	77	5.9*	3.8*	99.7	140.83
Female														
total cholestero	150-200	189.14	54.83	24.52	4	0.58	231.18	44.72	9.53	21	5.89	1.83	108.08	132.1
Triglycerides	60-200	123.5	47.22	21.12	4	0.31	178.27	68.8	14.67	21	3.29	1.68	95	137.13
HDL	45-65	66.27	14.09	6.3	4	1.79	65.73	12.46	2.66	21	4.04	0.08	120.49	119.51
LDL	50-160	109	65.95	29.49	4	0.14	134.33	41.33	8.81	21	3.33	1.11	103.81	127.93

t_1= Mean differnce between control and experimental Group
Significant at 1% ** significant at 5%

Table 11: Mean nutrient intake in control and experimental group

	control group			experimental group			t
	Mean	± SD	SE	Mean	± SD	SE	
Male							
Energy(Kcal)	2039.21	520.56	279.64	2610.57	582.64	65.97	5.44*
protein(g)	50.17	13.73	10.56	65.08	21.43	2.43	4.19*
fat(g)	59.52	31.88	15.91	86.22	28.94	3.28	4.75*
CHO(g)	263.75	67.86	31.8	337.52	94.66	10.72	4.59*
calcium (mg)	831.26	402.81	209.18	698.12	337.06	38.17	1.96**
sodium(mg)	2170.15	659.4	162.18	3077.65	805.55	91.21	6.42*
Fiber	42.87	22.98	8.92	29.85	8.26	0.94	4.53*
Female							
Energy(Kcal)	1919.82	30.34	137.89	2797.6	663.83	141.53	1.85
protein(g)	51.17	9.14	4.09	66.14	18.16	3.87	1.77
fat(g)	77.8	33.92	15.17	76.18	27.23	5.81	0.11
CHO(g)	205.79	141.57	63.31	370.15	129.69	27.65	2.05
calcium (mg)	995.32	272.6	121.91	719.85	306.46	65.34	1.85
sodium(mg)	2287.53	459.38	205.44	3024.08	1067.28	227.54	1.49
Fiber	67.92	8.02	3.59	29.99	4.95	1.06	8.77*

t= mean difference between control and experimental group
** signiicant at 5%, * significant at 1%

Table 12: Correlation between age and blood pressure in control and experimental group

Blood pressure	Group	Age group					R^2	r
		20-29	30-39	40-49	50-59	above 59		
Systolic	Control	120	118.69	121.5	121.81	131.66	0.925	0.961
	Experimental	140	133.05	130.93	133.15	132.66	0.871	0.933
Diastolic	Control	80	80.53	79.96	79.81	83.33	0.995	0.997
	Experimental	81.7	85.35	85.41	79	85.73	0.798	0.893

Table 13: Correlation between mean lipid profile and age

lipid profile	experimental age group(mean)					R^2	r
	20-29	30-39	40-49	50-59	above 59		
total cholesterol	271.8	235	259.2	245.4	209.5	0.917	0.957
Triglycerides	141	169.4	171.6	197.9	151.2	0.837	0.914
HDL	54.5	61	67.5	60.7	55.4	0.869	0.932
LDL	122.3	137.5	157.4	140.8	128.7	0.865	0.93

Table 14: Correlation between lipid profile and blood pressure

lipid profile	Experimental group BP(Systolic)							R^2	r
	90-110	101-110	111-129	121-130	131-140	141-150	150above		
total cholesterol	267.7	245.8	250.3	255.3	248.5	240.4	214.9	0.743	0.861
Triglycerides	189.5	135.2	175.5	200.3	176.9	199.6	145	0.14	0.374
HDL	60	56.8	62.7	64.7	63.7	64.3	64.2	0.64	0.8
LDL	160.6	127	148	157.9	157.9	135.8	122.7	0.0319	0.564

5. Conclusion

The result in the present study shows that male between the ages of 39-59 was more vulnerable with physical inactivity, non – vegetarian dietary habits. Also there was high lipid profile were observed in newly diagnosed cardio vascular disease patients then control group. The dietary intake of nutrient mainly fat, carbohydrate and sodium was found to be higher in cardio vascular disease population than the control group. The high positive correlation between age group, blood pressure and lipid profile. Further confirms its importance in the indication of cardio vascular disease.

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