A STUDY OF ASSOCIATION BETWEEN SERUM LIPID PROFILE AND HYPERTENSION IN MALES

Physiology

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ABSTRACT

Hypertension is one of the leading causes of the global burden of diseases. Hypertension is defined as an average SBP≥140 mmHg and DBP≥90 mmHg without antihypertensive medication. It has been recognized as the most common cardiovascular disorder and a leading cause of morbidity and mortality in both developed and developing countries. The changes in serum lipid profile levels should be actively investigated, and a few studies have established relation between hypertension and hyperlipidemia.101 subjects (31-60 yrs age) were selected, 52 controls and 49 cases on basis of their blood pressure recording.. The study showed a positive relation between lipid profile and blood pressure in hypertensive patients which are statistically significant.(p < 0.0001).. From the present study we can conclude that increase in plasma lipid level has direct effect on blood pressure

KEYWORDS

Hypertension, Systolic blood pressure, Diastolic blood pressure.

INTRODUCTION:
Population studies suggest the blood pressure (BP) is a continuous variable, with no absolute dividing line between normal and abnormal values. High blood pressure is a leading risk factor for heart disease, stroke, and kidney failure. Essential hypertension is characterized by a sustained systolic pressure of greater than 140 mm Hg and a diastolic BP at greater than 90 mm Hg.2 High blood pressure is a leading risk factor for heart disease, stroke, and kidney failure. The largest proportion of Non communicable disease(NCD) deaths is caused by cardiovascular diseases (48%). In terms of attributable deaths, raised blood pressure is one of the leading behavioral and physiological risk factor to which 13% of global deaths are attributed. Hypertension is reported to be the fourth contributor to premature death in developed countries and the seventh in developing countries. An excessive daily intake of saturated fats, cholesterol, and other sources of calories and subsequent disturbance of lipid profile leading to hypertriglyceridemia and hypercholesterolemia are associated with obesity and, consequently, hypertension.3,4hence this study was undertaken to study the relationship between lipid profile and blood pressure of male individuals

MATERIALS AND METHODS: The present study was carried out in the Department of Physiology, Assam Medical College & Hospital. The study group includes 49 males of age group 31-60yrs, who presented with hypertension(Systolic blood pressure ≥ 140 mm Hg and/or Diastolic blood pressure ≥ 90 mm Hg and /or is on hypertensive drugs.) and control group includes 52 age matched apparently healthy individuals, without any evidence of disease..males with complications of hypertension were excluded from the study..Subjects with Diabetes Mellitus, Renal Disease, Hypothyroidism, Obstructive Jaundice, Coronary artery disease, Alcoholics – History, Patients on steroids, statins and OCP's SLE, Systemic sclerosis, Congestive Cardiac Failure were excluded. Parameters Estimated were Blood pressure,Serum Cholesterol,Serum Triglyceride,Serum HDL,Serum LDL,Total Cholesterol: HDL Cholesterol,LDL Cholesterol:HDL Cholesterol. Age, Sex , Height, Weight were noted . blood pressure was classified according to JNC–VIII classification for the blood pressure levels 5. ethical committee clearance and an informed consent of the subjects were taken .Blood pressure was recorded in the right arm in sitting position by using a standard mercury sphygmomanometer with appropriate cuff sizes, after the participants had been sitting for at least 10 minutes. Three readings were taken at an interval of at least 5 minutes and the average of three readings was considered as the blood pressure of the individual. Collection of blood sample was done by keeping the individual fasting for 8-12 hours prior to the test. Only water was permitted. About 3 ml of blood was collected from the antecubital vein. As a routine measure, perfectly clean, dry and sterile syringe and vials were used for collection of the blood. The collected blood was centrifuged, serum was carefully separated and used for analysis. For Cholesterol (CHOD-POD Method),For HDL Cholesterol Only (CHOD-POD/Phosphotungstate Method)was used. For LDL (mg/dl)Friedewald's Formula was used.

LDL (mg/dl) = Total Cholesterol - HDL - Triglyceride /5.

For Estimation of serum triglyceride photocolorimetry was used:-

$$\text{Triglycerides(mg/dL)} = \frac{\text{Abs.of Test}}{\text{Abs.of Standard}} \times 200.$$

Estimation of Total Cholesterol: HDL was done by:-
Total Cholesterol: HDL = Total Cholesterol ÷ divided by HDL .

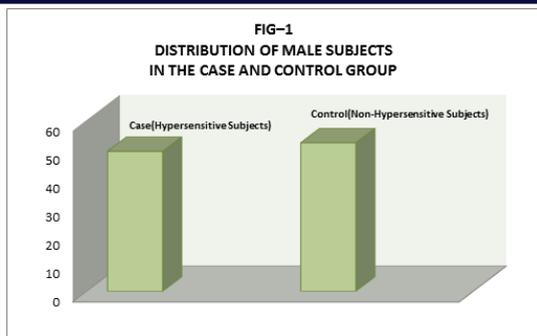Estimation of LDL: HDL Cholesterol :-Calculated by LDL divided by HDL.

lipid profile levels were taken according to National Cholesterol Education Program ,ATP III Classification of LDL, Total, and HDL Cholesterol (mg/dL) 6 . The data was analyzed by using Microsoft Excel and Statistical Package of Social Sciences(SPSS version 20.0). The mean and standard deviation (SD) were calculated and reported for the quantitative variables.The association was calculated with the help of chi-square test.

RESULT AND OBSERVATION:
The study group includes 49 numbers of male cases and Control Group includes 52 apparently healthy males which is shown in table 1 and figure 1. Mean systolic and diastolic blood pressure of the study and the control group were shown in table 2 On comparision between cases and control a rise in blood pressure was noted,which was statistically significant .The mean serum lipid profile in the study and the control group were shown in table 3 and figure 2.The table shows that total cholesterol, triglyceride, LDL-Cholesterol , Total Cholesterol: HDL Cholesterol , LDL Cholesterol: HDL Cholesterol were increased significantly in cases as compared to control,but the HDLCholesterol (mg/dl) was raised significantly in controls as compared to cases.The Distribution of the case and control group according to their serum lipid profile were shown in table 4.the table shows a positive association between that total cholesterol, triglyceride, LDL-Cholesterol , Total Cholesterol: HDL Cholesterol , LDL Cholesterol: HDL Cholesterol and blood pressure and a negative association between HDLCholesterol and blood pressure

TABLE 1:- showing the distribution of study population

STUDY SUBJECTS	MALE
	n
CASE (Hypertensive Subjects)	49
CONTROL (Non-Hypertensive Subjects)	52

FIG-1
DISTRIBUTION OF MALE SUBJECTS
IN THE CASE AND CONTROL GROUP

TABLE 2: Showing the Mean±SD of systolic and diastolic blood pressure of the study and the control group

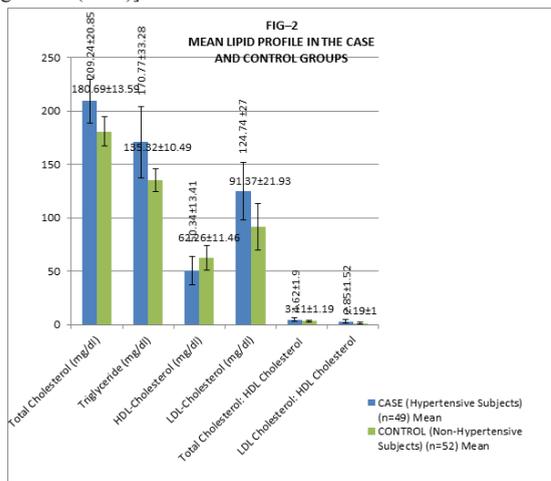| BLOOD PRESSURE	CASE (Hypertensive Subjects) (n=49)		CONTROL (Non Hypertensive subjects) (n=52)		p-value
	Mean	± SD	Mean	± SD	
SBP (mmHg)	155.02	17.55	120.17	5.99	<0.01
DBP (mmHg)	94.57	7.16	77.26	3.94	<0.01

[p value > 0.05- non-significant (NS);p value < 0.05- as significant(S) ;p value < 0.01-highly significant (HS);p value < 0.001- very highly significant(VHS)]

TABLE3: Mean serum lipid profile in the study and the control group

LIPID PROFILE	CASE (Hypertensive Subjects) (n=49)		CONTROL (Non-Hypertensive Subjects) (n=52)		p-value
	Mean	± SD	Mean	± SD	
Total Cholesterol (mg/dl)	218.43	18.91	196.56	14.54	<0.01
Triglyceride (mg/dl)	188.33	33.68	147.75	8.84	<0.01
HDL-Cholesterol (mg/dl)	44.04	12.75	48.23	14.16	<0.01
LDL-Cholesterol (mg/dl)	136.72	23.63	118.77	25.35	<0.01
Total Cholesterol: HDL Cholesterol	5.41	1.7	4.53	1.64	<0.01
LDL Cholesterol: HDL Cholesterol	3.46	1.35	2.85	1.41	<0.01

[p value > 0.05- non-significant (NS);p value < 0.05- as significant(S) ;p value < 0.01-highly significant (HS);p value < 0.001- very highly significant(VHS)]

FIG-2
MEAN LIPID PROFILE IN THE CASE AND CONTROL GROUPS

■ CASE (Hypertensive Subjects) (n=49) Mean
■ CONTROL (Non-Hypertensive Subjects) (n=52) Mean

TABLE4: Distribution of the case and control group according to their serum lipid profile.

LIPID PROFILE		CASE (Hypertensive Subjects)		CONTROL (Non Hypertensive Subjects)		p-value
		N	%	n	%	
Total Cholesterol (mg/dl)	Normal	13	26.54	20	38.46	< 0.01
	High	36	73.46	32	61.54	
Triglyceride (mg/dl)	Normal	14	28.57	22	42.31	< 0.01
	High	35	71.43	30	57.69	
HDLCholesterol (mg/dl)	Low	27	55.1	19	36.54	<0.01
	Normal	13	26.53	19	36.54	
	High	9	18.37	14	26.92	
LDL Cholesterol (mg/dl)	Normal	11	22.45	12	23.08	< 0.01
	High	38	77.55	40	76.92	
Total Cholesterol:HDL Cholesterol	Normal	17	34.69	30	57.69	< 0.01
	High	32	65.31	22	42.31	
LDL Cholesterol: HDL Cholesterol	Normal	19	38.77	33	63.46	< 0.01
	High	30	61.23	19	36.54	

[p value > 0.05- non-significant (NS);p value < 0.05- as significant(S) ;p value < 0.01-highly significant (HS);p value < 0.001- very highly significant(VHS)]

DISCUSSION:

Hypertension is recognized as the most common cardiovascular disorder and a leading cause of morbidity and mortality in both developed and developing countries. Dyslipidaemia (hyperlipidaemia), which is associated with hypertension, has been recognised as an independent risk factor for cardiovascular disease. So during work up of hypertensive patients it is worthwhile to investigate for all risk factors of CAD, especially lipid profile[7]. In our study, it was found that the mean cholesterol value in case group was (218.43mg/dl ±18.91) and in the control group the mean value was (196.56mg/dl ± 14.54). It was also seen that in the case group the number of subjects with high cholesterol values were (73.46%) and with normal cholesterol values were (26.54%). And in the control group number of subjects with high cholesterol values were (61.54%) and with normal cholesterol values were (38.46%). It was seen, that in the case group the number of subjects with high cholesterol was more than in the control group ,and it is statistically significant . (p<0.01).which is similar with the study by Kamrun Nahar Choudhury et al,(2014)[8] In this study it was also seen that the mean triglyceride and mean LDL values in the case group were (188.33mg/dl ±33.68) and (136.72/dl ± 23.63) respectively, while in the control group the mean triglyceride and mean LDL values were (147.75mg/dl ±8.84) and (118.77mg/dl ± 25.35) respectively. In the case group the number of subjects with high triglyceride values were (71.43%) and that with normal triglyceride values were (28.57%). And in the control group, number of subjects with high triglyceride values were (57.69%) and that with normal triglyceride values were (42.31%). As for LDL, the number of subjects in the case group with high LDL values were (77.55%) and that with normal LDL values were (22.45%).While in the control group with high LDL values were (76.92%) and that with normal LDL values were (23.08%). It is seen that ,in the case group the number of subjects with high triglyceride and high LDL values were more than in the control group ,and it is statistically significant.(p<0.05). which is similar with the study by Sarkar D et al, (2007)[9] In this study it was also found that the mean HDL value in the case group was (44.04mg/dl ± 12.75) , while in the control group the mean HDL value was (48.23mg/dl ± 14.16).In the case group the number of subjects with high HDL values were (18.37%), whereas in the control group number of subjects with high HDL values were (26.92%). In this study , it was seen that, in the case group the number of subjects, with high HDL were lower than in the control group ,and it is statistically significant.(p<0.01). The mean cholesterol:HDL ratio and LDL:HDL ratio values in the case group were (5.41mg/dl ± 1.7) and (3.46/dl ± 1.35) respectively. And the mean cholesterol:HDL ratio and LDL:HDL ratio values in the control group were (4.53mg/dl ± 1.64) and (2.85mg/dl ± 1.41) respectively. Also it is seen that the number of subjects with high cholesterol:HDL

ratio and LDL:HDL ratio values in the case group were (65.31%) and (61.23%) respectively. While in the control group, number of subjects with high cholesterol:HDL ratio and LDL:HDL ratio values were (42.31%) and (36.54%) respectively. It was seen that, in the case group the number of subjects, with high cholesterol:HDL ratio and LDL:HDL ratio values were more than the control group ,and it is statistically significant.($p<0.05$),which was similar with the study done by *Dharma Rao Vanamali et al, (2014)*[10] where it was found that TC/HDL and LDL/HDL ratios were significantly elevated in patients with hypertension ($p < 0.05$).Hypertension is already recognized as one of the major risk factors in the development of coronary atherosclerosis , it frequently coexist with other risk factors, especially dyslipidemia , which may act synergistically in the pathogenesis of atherosclerosis disease.[11.] Hyperlipidemia as a comorbid factor increases hypertension morbidity The present study revealed a significant relationship between dyslipideamia and hypertension. The mean value of serum cholesterol, triglycerides, LDL, Cholesterol: HDL ratio and LDL:HDL ratios were significantly higher while the serum levels of HDL was significantly lower in case group than control groups . This finding goes with previous studies, that show an increase in the prevalence of dyslipideamia in hypertensive patients.

CONCLUSION:
The study was undertaken for providing information to the health planners and clinical practitioners about the importance of routine monitoring of serum lipid profile in hypertensive patients for prevention of cardio vascular diseases and other consequences, to combat morbidity and mortality and to reinforce the need to consider these parameters in daily clinical practice.

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