Original Article

A study of lipid profile in hypertension

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Abstract

Background: High blood pressure has been associated with elevated atherogenic blood lipid fractions. A better understanding of the relation between blood pressure and blood lipids may provide insight into the mechanisms where by hypertension is associated with increased risk of coronary heart disease. **Methods:** The serum lipid profiles of 100 hypertensive patients was studied and compared with those of healthy controls. The serum lipid profiles were studied with respect to various clinical profiles like age, sex, type, incidence etc. **Results:** Higher number of patients with hypertension were elderly in the age group of 50-69 years. The Serum values of Total Cholesterol (TC), Very Low Density Lipoprotein (VLDL), Low Density Lipoprotein (LDL), Total Cholesterol (TC)/High Density Lipoprotein (HDL), Triglycerides (TGL), Low Density Lipoprotein (LDL)/High Density Lipoprotein(HDL) were significantly elevated in hypertensive group as compared to healthy controls. The LDL, TC/ HDL and LDL /HDL were also raised in obese patients which is statistically significant. TC/HDL and LDL/HDL were raised in Cerebrovascularaccident (CVA) group compared to non-CVA group, which is statistically very significant. The Incidence of Hyperlipidemia was more in females and majority of patients belong to type-IIa Hyperlipidemia. **Interpretation and Conclusion:** There was a significant alteration of lipid profile in hypertensive patients as compared to controls. Total cholesterol, LDL cholesterol, triglycerides, VLDL, TC/HDL and LDL/HDL ratios were significantly elevated in patients with hypertension. Hyperlipidemia was seen in majority of cases of hypertension with Type IIa pattern being the most frequent. Mean TC, LDL, TC /HDL, LDL/HDL were higher in obese. Mean TC, LDL, TC/ HDL and LDL/HDL ration were raised in CVA group.

Keywords: Cerebrovascular accident, Hypertension, Lipoprotein, Obesity.

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INTRODUCTION

High blood pressure has been associated with elevated atherogenic blood lipid fractions[1]. A better understanding of the relation between blood pressure and blood lipids may provide insight into the mechanisms where by hypertension is associated with increased risk of coronary heart disease. Hypertension and hyperlipidemia are recognized as major risk factors in development of CHD as evidenced by a number of epidemiologic studies throughout the work[2]. According to these concepts, the development of atherosclerotic plaque begins when low density lipoprotein migrates from the blood stream through the arterial endothelium into the arterial wall[3]. Here it is picked up by receptor sites and taken into smooth muscle cells from the media. The atherosclerotic process starts when these cells migrates into the intima, proliferate and ultimately break down into atherosclerotic plaque. Hypertension in this scheme plays its role by damaging the endothelial lining of the artery and facilitating the passage of LDL, particularly at the sites of arterial bifurcation were stress and she arare maximal. The Framingham study revealed that HDL-C level was a major potent lipid risk factor having an inverse association with the incidence of CHD both in men and women; the proposed hypothesis that HDL facilitates the uptake of cholesterol form peripheral tissue and helps in its transport to liver for degradation and excretion. However lower HDL level, higher LDL levels and TC/HDL ratio are more predictive of coronary heart disease[4-6].

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MATERIALS AND METHODS

A Cross sectional study was carried out in Katuri Medical College and Hospital, Chinakondrupadu, Guntur District during the period between October 2014 to March 2015. A Total of 100 patients of essential hypertension attending the hospital and 50 healthy control subjects were included in the study. The patients were in the age group of 40-80 years. Both known hypertensive patients who were on treatment for a varying period of time and newly diagnosed hypertensive patients were included in the study.

Inclusion Criteria

patients with essential hypertension with or without complication of hypertension and on medication were included for Study. Systolic Blood pressure > 140 mm Hg and diastolic > 90 mm Hg based on average of two readings are considered.

Exclusion Criteria

Secondary hypertensive subjects were excluded from the study. Patients with acute illness like high grade fever and first two weeks following surgery were excluded from the study. After selection of cases for the study each patient was subjected for the followings as per format. A detailed history, Careful physical examination, Laboratory investigations which includes complete blood count, Urine-albumin, sugar, microscopy, Fasting blood sugar, post-prandial blood sugar, Electro cardiograph, Lipid profile (Total cholesterol, HDL cholesterol, LDL cholesterol, VLDL, Triglycerides),2D Echo Cardiogram, cardiac isoenzymes (CPK, SGOT, LDH), chest X-ray were done in relevant cases. The Parameters were analysed by Microsoft excel.

RESULTS

Higher number of patients with hypertension were elderly in the age group of 50-69 years (Table 1). Serum TC, TGL, VLDL, LDL, TC/ HDL, LDL/ HDL were significantly elevated in hypertensive group as compared to healthy controls (Table 2). The LDL, TC/ HDL and LDL /HDL were also raised in obese patients which is statistically significant (Table3). TC/HDL and LDL/HDL are raised in CVA group compared to non-CVA group, which is statistically very significant (Table 4). The Incidence of Hyperlipidemia was more in females (Table 5) and majority of patients belong to type-IIa Hyperlipidemia (Table 6).

Table 1: Age and sex wise distribution of hypertensive patients

Age Group	Male	Female	Total
40-49	20	03	23
50-59	25	05	30
60-69	36	06	42
70+	05	00	05
Total	**86**	**14**	**100**

Table 2: Comparison of lipid levels between hypertensive patients and healthy controls(Mean± S.D)

Subjects	No. of Case	TC	TGL	HDL	LDL	VLDL	TC/HDL	LDL/HDL
Hypertension	100	194.0±39.49	163.6± 60.8	39.78± 6.37	121.0± 41.2	32.7± 12.2	4.96± 1.31	3.10± 1.25
Healthy	50	155.6± 15.4	125.5± 22.7	54.5± 4.2	76.1± 11.4	25.3± 4.5	2.8± 0.2	1.4±0.2
Significance		P<0.0001	P<0.0001	P<0.0001	P<0.0001	P<0.0001	P<0.0001	P<0.0001

P<0.05 - significant, P<0.001 - highly significant, P<0.01 – very significant, NS – not significant.

Table 3: Comparison of lipid levels between obese patients and non obese hypertensive patients

Subjects	No. of Cases	TC	TGL	HDL	LDL	VLDL	TC/HDL	LDL/HDL
Obese	25	205±41.4	163.0±49.3	40.1±7.01	141.0±43.0	32.7±9.85	5.49±1.43	3.55± 1.55
Non Obese	75	187±38.8	164.0±64.8	39.7±6.23	114.0±38.6	32.7±13	4.79±1.23	2.95±1.11
Significance		NS	NS	NS	P<0.01	NS	P<0.05	P<0.05

P<0.05 - significant, P<0.001 - highly significant, P<0.01 – very significant, NS – not significant.

Table 4: Comparison of lipid levels between CVA patients and non-CVA hypertensive patients

Subjects	No. of Cases	TC	TGL	HDL	LDL	VLDL	TC/HDL	LDL/HDL
CVA	15	227.0±25.7	181.0±71.9	38.8±5.13	152.0±28.8	36.2±14.1	5.91±0.95	3.93± 0.89
Non-CVA	85	188.0±38.9	161.0±58.9	40.0±6.61	115.0±40.7	32.1±11.8	4.80±1.30	2.96± 1.26
Significance		P<0.001	NS	NS	P<0.01	NS	P<0.01	P<0.01

P<0.05 - significant, P<0.001 - highly significant, P<0.01 – very significant, NS – not significant.

Table 5: Incidence of Hyperlipidemia

	Male	Female	Total
No.of patients studied	86	14	100
No.of patients with hyperlipidemia	61	12	73
Percentage (%)	70.93	85.71	73

Table 6: Types of Hyperlipidemia encountered in the study

Types of Hyperlipidemia	Males	Females	Total	Percentage (%)
Type I	08	04	12	16.43
Type IIa	25	00	25	34.24
Type IIb	18	02	20	27.39
Type III	00	00	00	0
Type IV	10	06	16	21.91
Type V	00	00	00	0

DISCUSSION

In the present study a total of 100 patients of essential hypertension and 50 healthy control subjects were included. Hypertension was defined according to JNC VII, a systolic blood pressure of ≥ 140 mmHg and diastolic blood pressure of ≥ 90mmHg. Blood samples were drawn for lipid profile analysis. From all the patients. Lipid profile values were analyzed with various clinical parameters as discussed below.

Age and Sex distribution of hypertensives

In the present study group age range was from 46-76 years and mean age was 59.6 years. Higher number of patients of hypertension were seen between age group 50-69 years contributing to 72% of the cases studied. 29.1% of men and 35.7% of women aged 50-59 years and 41.8% of men and 42.8% of women are in the age group of 60-69 years. In the present study there were 86 males and 14 females.

Serum lipids in hytpertension compared with those of healthy controls

The present study has shown that all the lipid fractions TC, TGL, LDL-C, VLDL, TC/HDL-C and LDL/HDL-C ratio were higher in the hypertensive than those in the healthy controls which is in accordance with most of the previous reports by various workers. In the present study all the lipid fractions were elevated except HDL-C, which was reduced. The change in TC, TGL, HDL-C, LDL-C, VLDL-C, TC/HDL-C, LDL-C/HDL-C was statistically significantly higher in hypertensive subjects compared to healthy controls. Castelli *et al*, had supported that blood pressure and serum cholesterol are correlated with 'r' factor of 0.12 suggesting that those with higher blood pressure values tend to have higher serum cholesterol in Framingham heart study. Coronary heart disease developed with great consistency in patients with a ratio of total cholesterol to HDL-C of more than 4.5 Half of the women and more than half of the men who presented with hypertension were already having abnormal lipid profile[7]. Pramila devi *et al*, had supported that hypertensives were associated with elevated TC, LDL, TC/HDL[8]. Chen Y-DI *et al*, in their study found that mildly hypertensive patients appears to have faster catabolic rate of Apo-A1/ HDL and lower HDL-C concentration[9]. Sarkar et.al, had showed that most of the hypertensive patients were associated with elevated TC, TG, LDL cholesterol and low HDL-C[10].

Incidence and type of hyperlipidemia

In the present study 73 patients had hyperlipidemia among which 61 were males and 12 females. 16.43% belong to Type I, 34.24% belong to Type IIa, 27.39% belong to Type IIb and 21.91% belong to Type IV hyperlipidemia. Hakim *et al*, in his study found that in hypertensive subjects dyslipidemia was present in 40% of patients. Male to female ratio was 3:2. In their study most prevalent abnormal lipid pattern was hypercholesterolemia encountered in 55% of patients and isolated high triglycerides with normal cholesterol was 13%[11]. Assmann *et al*, in PROCAM study found that most prevalence of lipid abnormality was TC 200-250 mg/dl and TC < 200 mg/dl encountered 37.4% for men and 41.3% for women. TC 251-300mg/dl and TG< 500mg/dl was 20.4% for men and 62% for women. In the present study 73 patients had hyperlipidemia among which 61 males and 12 females. Male to female ration was 5:1. 16.43% belong to Type I, 34.24% belong to Type IIa, 27.39% belong to Type IIb and 21.91% belong to Type IV hyperlipidemia[12-14].

CONCLUSION

There was a significant alteration of lipid profile in hypertensive patients as compared to controls. Hypertension was more common in middle aged and elderly subjects and males were more commonly affected than females. Total cholesterol, LDL cholesterol, triglycerides, VLDL, TC/HDL and LDL/HDL ratios were significantly elevated in patients with hypertension. HDL was significantly reduced in hypertensive subjects. Type IIa hyperlipidemia was seen in majority of cases of

hypertension. LDL/HDL ratio was raised in men, when compared with women which was statistically significant. The mean values of TC, LDL, TC/HDL, LDL/HDL were higher in obese when compared with non-obese hypertensive patients which was statistically significant.

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