

Research Article**A study of lipid profile in cases of hypertension presenting at Shahida Islam Teaching Hospital, Lodhran**

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ABSTRACT

Objective: To study lipid profile in cases of hypertension presenting at Shahida Islam Teaching Hospital, Lodhran

Material and methods: This descriptive study was conducted at Department of Medicine Shahida Islam Teaching Hospital Lodhran from March 2017 to September 2017. A total of 100 patients admitted with hypertension were the participants of the study. The patients are in the range 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.

Results: Serum TC, TGL, VLDL, LDL, TC/ HDL, LDL/ HDL were significantly elevated in hypertensive group as compared to healthy controls. Serum HDL was low in patients with hypertension as was compared with controls, which was statistically significant. The LDL was raised in obese compared to non-obese patients, which is statistically very significant. TC/ HDL and LDL/ HDL were also raised in obese patients which is statistically significant. TC is raised in CVA group, which is statistically highly significant. LDL is raised in CVA group, which is statistically very significant. TC/ HDL and LDL/ HDL are raised in CVA group compared to non-CVA group, which is statistically very significant. TC is raised in IHD group, which is statistically significant. LDL is raised in IHD group, which is statistically very significant. LDL/HDL is raised in men, which is statically significant.

Interpretation and Conclusion: There is significant alteration of lipid profile in hypertensive patients as compared to controls. Total cholesterol, LDL cholesterol, triglycerides, VLDL, TC/HDL and LDL/HDL ratios are significantly elevated in patients with hypertension. HDL is significantly reduced in hypertensive patients. Hyperlipidemia is 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 ratios are raised in CVA group. Mean TC and LDL are raised in IHD group.

Keywords : Hypertension; TC; LDL; HDL; VLDL; TGL; Cerebrovascular accident; Ischemic heart diseases; Obesity

INTRODUCTION

The proportion of elderly individuals is on the rise and hypertension is extremely common in this age group.¹ In addition cardiovascular and cerebrovascular diseases associated with elevated blood pressure are greater in elderly people.

52.2% of deaths due to CAD occur below the age of 70 years in India. There has been dramatic rise in the prevalence of coronary artery disease from 3.5% in 1960s to 11% in late 1990s in urban India and it is projected to rise substantially in

future.² Hypertension and abnormalities of lipid profile often co-exist. Several well conducted epidemiological studies have demonstrated that cholesterol levels are significantly higher in hypertensive patient than in age, sex and body mass index matched normotensive patient.³ Recent investigations have clearly demonstrated that atherosclerosis and left ventricular hypertrophy are major factor linking hypertension and lead to myocardial infarction. Mechanical stress, endothelial dysfunction, insulin resistance and genetic factors contribute to this association as common risk factors linking hypertension and myocardial infarction.⁴⁻⁶

Mildly hypertensive and hyper insulinemic patients appear to have faster fractional catabolic rate of apo A1-HDL and lower HDL-cholesterol concentration.

These changes appear to result from hyperinsulinemia rather than hypertension itself as they probably do in the patients with non-insulin dependent diabetes mellitus and hypertriglyceridemia.⁷ Biological inter relationship between hypertension and hypercholesterolemia may influence the mechanism whereby blood pressure is associated with coronary heart disease. The two risk factors appear to have synergistic relationship.⁸

So early detection of risk factors before the catastrophic and life-threatening effect of severe atherosclerosis is a major problem for the general public as well as for the practicing physician.⁹⁻¹² The evaluation of different fractions of lipoproteins as risk factors for development of coronary artery disease and hypertension has been possible only recently, when methods to fractionate lipoproteins were made available. But cholesterol was incriminated as an etiological factor for atherosclerosis in the beginning of this century, when cholesterol was found in atheromatous plaques.

Various studies around the world have well established that LDL and VLDL are atherogenic and HDL is a protective factor against coronary artery disease and hypertension.

Serum lipid and lipoprotein concentration are commonly used to identify individuals who may have significant atherosclerotic disease.

MATERIAL AND METHODS

This descriptive study was conducted at Department of Medicine Shahida Islam Teaching Hospital Lodhran from March 2017 to September 2017. A total of 100 patients admitted with hypertension were the participants of the study. The patients are in the range 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.

(a) **Inclusion criteria** for the selection of cases for the present study were as follows: - 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 mmHg based on average of two readings or one in case of known hypertensive and on antihypertensive medication.

(b) **Exclusion criteria** (1) Secondary hypertensive subjects were excluded from the study. (2) Patients with acute illness like high grade fever and first two weeks following surgery were excluded from the study. Purpose of elimination was to obtain a pure picture of relationship between hypertension and serum lipids. (3) Patients with diabetes mellitus, hypothyroidism and those receiving lipid-altering drugs were excluded.

(c) **Control study:** -Control group consisted of 50 subjects.

After selection of cases for the study each patient was subjected for the followings as per format

1. A detailed history
2. Careful physical examination
3. Laboratory investigations
 - Complete blood count
 - Urine - albumin, sugar, microscopy
 - Fasting blood sugar, post-prandial blood sugar
 - ECG

- Lipid profile – total cholesterol, HDL cholesterol, LDL cholesterol, VLDL, Triglycerides
- ECHO / cardiac isoenzymes (CPK, SGOT, LDH)/ chest X-ray were done in relevant cases.

The blood samplings were drawn from all the patients after a minimum of 12 hours of complete fasting. The patients were asked to have a light fat free diet on the day prior to the sampling.

All the collected blood samples were send to laboratory for lipid profile analysis.

All the collected data was entered in SPSS version 18. Mean and SD was calculated for numerical data and frequencies were calculated for categorical data.

RESULTS

A total of 100 patients suffering from essential hypertension and 50 healthy controls were studied. The results of various clinical and biochemical parameters and their inter relation are as follows.

Table – 1 shows age and sex distribution of subjects studied. A total number of 100 cases were studied among them 86 were males and 14 were females. Youngest patient in the study was 46 years old and oldest was 76 years.

Table - 2 Shows definite increase in total cholesterol (mean 194.0), when compared to 155.6 among healthy which is highly significant.

Triglyceride level in hypertensive subjects was 163.6 compared to 125.5 among healthy controls, which is highly significant.

A mean HDL level of 39.78 is noted in hypertensive when compared to 54.5 among healthy controls, which is highly significant.

There is significant increase in LDL level (mean 12.0) when compared to 76.1 among healthy controls, which is statistically highly significant.

VLDL values of 32.7 are noted in hypertensive

Table – 1

Age and sex wise distribution of hypertensive patients Age group	Male	Female	Total
40-49	20	3	23
50-59	25	5	30
60-69	36	6	42

subjects as compared to 25.3 among healthy, which is highly significant.

The ratio of TC /HDL shows a definite increase with a mean of 4.96 in hypertensive subjects when compared to 2.8 in healthy controls which is highly significant.

The ratio of LDL / HDL shows definite increase with mean of 3.10 in hypertensive subjects when compared to 1.4 in healthy control which is highly significant.

Table - 3 Shows the mean values with standard deviations of the various lipid fractions of obese and non obese hypertensive patients. Mean TC, LDL, TC /HDL, LDL/ HDL were higher in obese. The LDL was raised in obese compared to non-obese patients, which is statistically very significant. TC/ HDL and LDL /HDL were also raised in obese patients compared to non-obese, which is statistically significant.

Table - 4 shows the mean values of lipid fractions of CVA with hypertension and non-CVA with hypertension. It can be seen that TC is raised in CVA group, which is statistically highly significant. LDL is raised in CVA group, which is statistically very significant. TC/ HDL and LDL/ HDL are raised in CVA group compared to non-CVA group, which is statistically very significant. TGL, HDL and VLDL are not statistically significant.

Table – 5 shows the mean values of lipid fractions IHD patients and non –IHD patients. It can be seen that TC is raised in IHD group, which is statistically significant. LDL is raised in IHD group, which is statistically very significant. TGL, HD, VLDL, TC / HDL and LDL / HDL are not statistically significant.

Table – 6 shows the lipid level comparison between men and women. It shows that LDL/HDL is raised in men, which is statistically significant while others were not.

70 +	5	0	5
Total	86	14	100

Table – 2 Comparison of lipid levels between hypertensive patients and healthy controls

(Mean ± S.D) Subjects	No. of cases	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

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

(Mean ± S.D) 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

Table – 4 Comparison of lipid levels between CVA and non-CVA patients with hypertension

(Mean ± S.D) 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

Table – 5 Comparison of lipid levels between IHD and non-IHD patients with hypertension

(Mean ± S.D) Subjects	No. of cases	TC	TGL	HDL	LDL	VLDL	TC / HDL	LDL / HDL
IHD	29	209 ± 36	161 ± 50.2	40.8 ± 6.3	146 ± 65.5	32.1 ± 10.0	5.22 ± 1.17	3.32 ± 1.30
Non-IHD	71	188 ± 39.7	165 ± 65.3	39.4 ± 6.45	115 ± 39.6	33.0 ± 13.1	4.86 ± 1.36	3.01 ± 1.23
Significance		p<0.05	NS	NS	p<0.01	NS	NS	NS

Table – 6 Comparison of lipid levels between Men and Women hypertensive patients

(Mean ± S.D) Subjects	No. of cases	TC	TGL	HDL	LDL	VLDL	TC / HDL	LDL / HDL
Men	86	195 ± 43.3	160.0 ± 63.2	39.4 ± 6.5	124.0 ± 43.6	32.0 ± 12.6	5.06 ± 1.37	3.20 ± 1.32

Women	14	184.14 ± 13.78	186.71 ± 40.8	42.0 ± 5.49	104.07 ± 12.48	37.35 ± 8.17	4.37 ± 0.6	2.44 ± 0.47
Significance		NS	NS	NS	NS	NS	NS	p<0.05

DISCUSSION

Hypertension and hyperlipidemia are recognized as major risk factors in development of CHD as evidenced by a number of epidemiologic studies through out the world.¹¹ 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. 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 where stress and shear are maximal.¹⁰ 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 from 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 disease¹¹

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 ≥ 90 mmHg. Blood samples were drawn for lipid profile analysis, from all the patients. Lipid profile values were analyzed with various clinical parameters as discussed below.

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.

The present study was compared with PROCAM trial data analysis, which showed that prevalence of hypertension strongly increases with age in both sex.

Assmann G and Schulte H (1987) in his study showed that more than 10% of men and less than 5% of women under 30 years of age were hypertensive and 27 % of both men and women aged 40-49 years and 43 % of men and 37 % of women aged 50-59 years were hypertensive.¹²

The present study has shown that all the lipid fractions TC, TGL, LDL-C, VLDL, TC/HDL-C & 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, 60 TC/HDL-C, LDL-C/HDL-C was statistically significantly higher in hypertensive subjects compared to healthy controls. Castelli W. P, Anderson K.A (1986) 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 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.¹³

Bonna K.H, Thelle D.S (1991) had supported that in both sexes total and non HDL-C level increased significantly with increasing systolic or diastolic blood pressure. The association between blood pressure and total cholesterol level increased with age in women but decreased with age in men. Smoking, physical activity and alcohol consumption had little influence on the association between blood pressure and serum lipids.¹⁴ Chen Y-DI et al (1991) in their study found that mildly hypertensive patients appears to have faster catabolic rate of Apo-A1/ HDL and lower HDL-C concentration.¹⁵

In the present study, mean TC, LDL, TC /HDL, LDL/ HDL were higher in obese. The LDL was raised in obese compared to non-obese patients, which is statistically very significant. TC/ HDL and LDL /HDL were also raised in obese patients compared to non-obese, which is statistically significant (P<0.05)

Raj Lakshman M., et al (1996) found that plasma triglycerides increased progressively with increasing obesity, where as HDL decreased with increasing obesity.¹⁶

Bonna K.H (1991) in Tromso study sowed that when compared to lean subjects over weight subjects had greater increase in the total cholesterol and triglyceride level with increase in blood pressure.¹⁴

In the presents study it can be seen that TC was raised in CVA group, which is statistically highly significant. LDL was raised in CVA group, which is statistically very significant. TC/ HDL and LDL/ HDL were raised in CVA group compared to non-CVA group, which is statistically very significant. TGL, HDL and VLDL are not statistically significant.

This study is compared with the study done by Rajwade.N A., et al (1996), the levels of total cholesterol, LDL-C lipoprotein and triglyceride, the strokes patients were observed to have higher levels but not significantly than those of matched normal subjects.¹⁷

In the present study LDL/HDL is raised in men, which is statically significant while in others not. TC, LDL-C, TC/HDL are raised in men compared to women which is statistically not significant. TGL. HDL-C and VLDL were raised in women compared to men, which is statistically not significant.

Castelli W. P (1986) stated that triglycerides were a powerful predictor of CHD in women over age of 50, whereas no relationship was seen in men in univariate analysis. On multivariate analysis triglycerides are statistically significant risk factor in women.¹³

Karpanov E. A et al (1992) in study concluded that serum lipid and Apo variation during the menstrual cycle differ significantly between hypertensive and normotensive women. He states that, this should be taken under consideration in over all treatment of patients with the added risk of hypertension.¹⁸

INTERPRETATION AND CONCLUSION

There is significant alteration of lipid profile in hypertensive patients as compared to controls. Total cholesterol, LDL cholesterol, triglycerides, VLDL, TC/HDL and LDL/HDL ratios are significantly elevated in patients withhypertension. HDL is significantly reduced in hypertensive patients. Hyperlipidemia is 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 ratios are raised in CVA group. Mean TC and LDL are raised in IHD group.

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