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Original Research Article

To Measure Serum Lipid Profile in Newly Diagnosed Essential Hypertension Patients and its Comparison with Control Groups.

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Abstract:
Background &Method: The aim of the study is to measure serum lipid profile in newly diagnosed essential hypertension patients and its comparison with control groups.It study has been carried out in department of biochemistry in collaboration with department of medicine at R. D. Gardi medical college and associated C. R. G. H. Hospital, Surasa, Ujjain was carried out on total 162 subjects, 81 newly diagnosed essential hypertension cases and 81 age & sex matched healthy controls. Detailed medical history, demographic profile, complete physical examination and informed consent were obtained from all participants of the study.

Result: Distribution of clinical variables, blood pressure and lipid profile among cases and controls are described in Table 3. There were no significant difference of age, BMI, FBS, serum creatinine value among cases and controls ($p > 0.05$). Mean values of systolic blood pressure, diastolic blood pressure, total cholesterol, triglycerides, LDL and VLDL were significantly high in cases compared to controls ($p = 0.0001$). Mean value of HDL was significantly low in cases compared to controls ($p = 0.0001$).Correlations of systolic and diastolic blood pressure with various variables are described in Table 4. Systolic and diastolic blood pressures were significantly positively correlated with total cholesterol ($p < 0.00001$) and LDL cholesterol ($p < 0.00001$ and $p < 0.0002$). Systolic and diastolic blood pressures were significantly negatively correlated with HDL cholesterol ($p < 0.00001$ and $p = 0.0002$). There were no significant correlation of blood pressure with BMI and triglycerides. Distribution of dyslipidemia pattern is described in table 5. Most of the cases have high total cholesterol (69.1%) followed by high LDL-C (66.6%), high triglyceride (64.1%) and low HDL-C (44.4%).

Conclusion: Serum lipid levels varied in different groups according to age and sex in patients with hypertension. Dyslipidaemia is more common in non-elderly patients than elderly. TG, TC and LDL-C levels were higher in female patients than male.

Keywords:serum, lipid& hypertension.

Study Designed: Comparative Cross-Sectional Study

1. INTRODUCTION

Cardiovascular Disease (CVD) has been emerged as a most common cause of mortality in developing country like India. Age standardized CVD death is around 272 per 1 lakh

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population in India according to global burden of disease study.[1] Hypertension along with dyslipidemia (Lipitension) are crucial risk factors for development of CVD.[2]
Hypertension is estimated to responsible for 10.8% of all deaths in India. Prevalence of hypertension has been increased in adults of both urban and rural area and it is 25 % and 10-15% respectively.[3] Lateral pressure exerted by blood on the arterial wall is called arterial hypertension. Systolic blood pressure is the maximal pressure produced by blood during contraction of ventricles. It ranges between 100-140 mmHg with an average 120 mmHg in adult. Diastolic blood pressure is the minimal blood pressure produced by blood during ventricular relaxation.[4] Hypertension without any underlining cause is called essential hypertension and it is most common, around 90-95% among the hypertensive subjects.[5]
Dyslipidemia is metabolic abnormality leading to alteration in blood levels LDL-cholesterol, triglycerides and HDL-cholesterol.[6] Dyslipidemia may cause endothelial vascular damage and abnormal vasomotor activity results in increase in systolic arterial blood pressure.[7,8] Reciprocally, elevated blood pressure may also associated with alteration in blood lipid level.[9] Strong association between hypertension and dyslipidemia have been reported in various cross sectional studies.[10,11]
According to our best knowledge, no studies have been reported to find association between essential hypertension and blood lipid levels in our region. So based on above background, we planned to carried out cross sectional study to evaluate serum lipid profile in essential hypertension patients in population of Ujjain district.

Aims & Objectives
To measure serum lipid profile in newly diagnosed essential hypertension patients and its comparison with control groups. To find correlation between blood pressure and lipid profile variables.

2. MATERIAL & METHOD

It was a hospital based comparative cross sectional study. It study has been carried out in department of biochemistry in collaboration with department of medicine at R. D. Gardi medical college and associated C. R. G. H. Hospital, Surasa, Ujjain study was carried out on total 162 subjects, 81 newly diagnosed essential hypertension cases and 81 age & sex matched healthy controls. Detailed medical history, demographic profile, complete physical examination and informed consent were obtained from all participants of the study.

Inclusion criteria
Newly diagnosed essential hypertensive cases aged group between 30-75 years and body mass index (BMI) between 18.5-30.0 kg/m^2 attending to medicine OPD without any complication were selected as cases.

Exclusion criteria
Patients having obesity (BMI >30 kg/m^2), history of chronic alcoholism, family history of dyslipidemia, known cardiac disease, diabetes mellitus, pregnancy induced hypertension, kidney diseases, liver disorder, endocrinopathy and on lipid lowering drugs were excluded from the study.

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Diagnosis of hypertension and dyslipidemia

Systolic blood pressure ≥140 mmHg and diastolic blood pressure ≥90 mm Hg defined as a hypertension according to JNC-7 criteria for diagnosis of hypertension.[12] Classification of blood lipids and diagnosis of dyslipidemia was done according to ATP III criteria.[13] Total cholesterol level ≥ 200 mg/dl, LDL cholesterol ≥ 130 mg/dl, triglyceride level ≥ 150 mg/dl and HDL cholesterol level ≤ 40 mg/dl was defined as a high cholesterol, high LDL cholesterol, high triglycerides and low HDL cholesterol respectively.

Measurements of BMI and blood pressure

Height and body weight were measured in standing position. BMI was calculated by using standard formula, weight in kilogram divided by height in meter square (kg/m^2). Blood pressure was measured as per standard protocol for measurement by using mercury sphygmomanometer.[14] Explanation of procedure and minor discomfort of cuff inflation were explained to all participants to reduce fear and anxiety. Following condition were fulfilled before blood pressure measurements: no smoking, alcohol, heavy meal in last 30 minutes, back supported and arm supported on table, void bladder before measurement, legs uncrossed and both feet touches the ground. It was taken in left supported arm in after 10 minutes of rest in sitting position. If on first measurement blood pressure was >140/90 mmHg, second measurement was taken after minute interval. If difference in second measurement >5 mm Hg then third measurement was taken. If difference in third reading >10 mmHg then more measurements were done. Lowest reading of the last two measurements was considered final reading of the blood pressure in clinical setting. First systolic blood pressure was measured by palpatory method at radial artery to prevent ascultatory gap. Appearance of korotkoff phase I sound (clear tapping, gradually increased intensity) was considered as a systolic blood pressure and disappearance of korotkoff phase IV sound (distinct, abrupt muffling, gradually become soft) was considered as a diastolic blood pressure in auscultatory method of measurement.[14]

Blood sample collection and lipid profile assessment

4 ml venous blood was collected in plain vaccutainers from antecubital vein by venepuncture in morning hours after 12 hours of overnight fasting. All participants were instructed to remain seated for 20 minutes before venepuncture to prevent posture effects on lipid profile.[15]Vaccutainer was kept on rack for 30 minutes at room temperature for clotting process before centrifugation and then it centrifuge at 3000 rpm for 10 minutes to separate serum. Lipid profile was assessed on vitros250 dry chemistry auto analyzer. Total cholesterol, HDL-C and triglyceride were measured directly by using specific slide based dry chemistry kit. LDL-C was calculated by friedewald formula.[16]If triglyceride value was more than 400 mg/dl then LDL-C was calculated by modified friedewald formula.[17]

Statistical Analysis

Data were analyzed by using SPSS software 16.0. Graphs and tables were done in ms excel 2010. Quantitative values were expressed in mean and SD. Chi square test was used to find association between qualitative data. Student t test was used to find statistical significance of difference between cases and controls. Spearman's rank correlation coefficient was used to find correlation between quantitative variables. P value < 0.05 was considered a statistically significant.

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3. RESULTS

Age wise distributions of all subjects are described in table 1. Most of the cases were in age group of 61-75 year. There were no significant differences of age group among cases and controls (p = 0.949).

Table 1: Age wise distribution of cases and controls

Age group	Number of Cases (%)	Number of Controls (%)
30-45 Year	14 (17.3%)	15(18.5%)
46-60 Year	26 (32.0%)	27(33.3%)
61-75 Year	41(50.7%)	39(48.2%)
Total	81(100%)	81(100%)

Chi-square statistics=0.103, P=0.949

Sex wise distribution of cases and controls are described in Table 2. Most of the cases and controls were male. There were no significant differences of cases and controls in sex wise distribution (p = 0.750).

Table 2: Sex wise distribution of cases and controls

Sex	Number of Cases (%)	Number of Controls (%)
Male	48(59.3%)	46(56.8%)
Female	33(40.7%)	35(43.2%)
Total	81(100%)	81(100%)

Chi-square statistics=0.101, P=0.750

Table 3: Distribution of BMI, blood pressure and lipid profile among cases and controls

Variables	Controls (Mean ± SD)	Cases (Mean ± SD)	't' value*	P value
Age in year	56.81 ± 11.26	54.73 ± 13.21	1.07	0.282
BMI	26.00 ± 2.01	25.12 ± 3.54	1.94	0.053
SBP (mmHg)	162.11 ± 9.81	114.66 ± 6.62	36.08	0.0001
DBP (mmHg)	88.35 ± 5.73	73.33 ± 8.05	13.68	0.0001
FBS (mg/dl)	93.50 ± 8.45	91.25 ± 7.89	1.97	0.959
Creatinine (mg/dl)	0.85 ± 0.25	0.79 ± 0.21	1.98	0.10
Total cholesterol (mg/dl)	216.76 ± 34.48	148.16 ± 21.77	15.14	0.0001
Triglyceride (mg/dl)	176.86 ± 47.90	114.83 ± 18.65	10.86	0.0001
HDL (mg/dl)	40.08 ± 6.41	50.02 ± 11.89	6.62	0.0001
LDL (mg/dl)	141.30 ± 36.01	89.33 ± 9.49	12.25	0.0001
VLDL (mg/dl)	35.37 ± 9.58	23.58 ± 6.47	9.17	0.0001

*student t-test

Distribution of clinical variables, blood pressure and lipid profile among cases and controls are described in Table 3. There were no significant difference of age, BMI, FBS, serum creatinine value among cases and controls (p > 0.05). Mean values of systolic blood pressure, diastolic blood pressure, total cholesterol, triglycerides, LDL and VLDL were significantly high in cases compared to controls (p = 0.0001). Mean value of HDL was significantly low in cases compared to controls (p = 0.0001).

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Table 4: Correlation of SBP and DBP with BMI and lipid profile variables

Variables	SBP		DBP	
	r value*	P value*	r value*	P value*
BMI	0.113	0.315	0.117	0.298
Total Cholesterol	0.543	<0.00001	0.412	<0.0001
Triglycerides	0.180	0.107	0.069	0.540
HDL	-0.500	<0.00001	-0.423	0.0008
LDL	0.560	<0.00001	0.451	0.0002

*Spearman's rank correlation coefficient

Correlations of systolic and diastolic blood pressure with various variables are described in Table 4. Systolic and diastolic blood pressures were significantly positively correlated with total cholesterol ($p < 0.00001$) and LDL cholesterol ($p < 0.00001$ and $p < 0.0002$). Systolic and diastolic blood pressures were significantly negatively correlated with HDL cholesterol ($p < 0.00001$ and $p = 0.0002$). There were no significant correlation of blood pressure with BMI and triglycerides.

Table 5: Distribution of dyslipidemia among essential hypertensive cases

Pattern of dyslipidemia	Number of cases
Elevated total cholesterol (≥200 mg/dl)	56 (69.1%)
Elevated triglyceride (≥ 150 mg/dl)	52 (64.1%)
Low HDL-C (40 ≤ mg/dl)	36 (44.4%)
Elevated LDL-C (≥ 130 mg/dl)	54 (66.6%)

Distribution of dyslipidemia pattern is described in table 5. Most of the cases have high total cholesterol (69.1%) followed by high LDL-C (66.6%), high triglyceride (64.1%) and low HDL-C (44.4%).

4. DISCUSSION

Hypertension present with dyslipidemia is termed as a Lipitension.[18]Lipitension has a more than additive risk for development of CVD compared to only hypertension or dyslipidemia.[19] We carried out this study to evaluate dyslipidemia in newly diagnosed cases of essential hypertension.

We found significantly high systolic and diastolic blood pressure values in essential hypertension cases compares to controls. Similar finding has been observed by Osuji, et al[20] and Pooja, at al.[21] Total cholesterol and LDL cholesterol level were significantly high and positively correlated in essential hypertension cases. Similar findings have been reported by Bambara R, et al.[22] in north Indian population group. According to Framingham Heart Studydata, high total cholesterol and LDL-C has been observed in hypertension and associated with increased risk of CVD.[23]

HDL cholesterol level was significantly lower and negatively correlated in essential hypertension cases. A similar result was reported by Pramiladevi R, et al.[24] in rural area of Karnataka. It was postulated that optimum HDL associated with decreased risk of of CVD due to its reverse cholesterol transport, anti-inflammatory and anti-oxidant properties.[25] Low HDL may initiate endothelial dysfunction and responsible for increased blood pressure and CVD risk.[26]

Essential hypertension alters lipid metabolism by over expressing the enzymes of lipid oxygenation and produce potent atherogenic oxidized LDL.[27] Lipid peroxidation at

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endothelium level in essential hypertension is responsible for altered lipid levels and increased oxidative stress.[28] Dyslipidemia has also been associated with increased risk for essential hypertension.[29] Endothelial and vasomotor dysfunction[10] in dyslipidemia lead to alteration in nitric oxide production and expression of endothelin 1 receptor[30] that ultimately cause constriction of peripheral arterioles and hypertension. Our results are biologically accepted based on above explanation. Based on our result dyslipidemia is highly prevalent in essential hypertension. Timely diagnosis and treatment of dyslipidemia and life style changes in essential hypertension patients may reduce further cardiovascular morbidity and mortality. Small sample size and hospital based study are limitation of the study. Multicentric population based study should be done on larger sample size to validate our results.

5. CONCLUSION

Serum lipid levels varied in different groupsaccording to age and sex in patients with hypertension.Dyslipidaemia is more common in non-elderlypatientsthan elderly. TG, TC and LDL-Clevels were higher infemale patients than male.

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