ORIGINAL RESEARCH

Lipid profile analysis of patients with high blood pressure and correlation between hypertension and lipid profile in normal and pre-hypertensive patients

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ABSTRACT

Introduction: Therefore increased level of blood lipids signify the increased cardiovascular risk in subjects suffering from prehypertension. So early detection of this derangement and early intervention may arrest the progression of prehypertension to hypertension and prevent the complications of individuals suffering from hypertension. Our aim was to find the evaluation of lipid profile among pre-hypertensive and normotensive and its correlation between blood pressure and lipid profile in pre-hypertensive patients. **Materials and Methods:** Blood pressure was measured with the sphygmomanometer from the right arm of seated participant after five minutes rest and was recorded using 1st and 5thkorotkoff sounds. The appearance of 1stkorotkoff sound was taken as systolic blood pressure (SBP) and 5thkorotk off sound was taken as diastolic blood pressure (DBP). Three blood pressure measurements were taken and the mean of the last two measurements were used for analysis. 5 ml of venous blood was collected after overnight fasting of 12 hrs in all the subjects for estimation of serum total cholesterol, HDL cholesterol, LDL cholesterol, VLDL cholesterol, and serum triglyceride by standard enzymatic method. **Result:** Comparison of basic characteristics like age, height, weight and BMI between two groups did not show significant different between the two group ($p>0.05$). The two groups were similar in terms of basic characteristics. **Conclusion:** The higher level of serum TC, TG and LDL- cholesterol in the study population may be due to genetic factors and increased consumption of dietary animal fat, lack of physical exercise, metabolic disorders like diabetes mellitus and hypothyroidism, severe stress, increased age, sex as well as alcohol and tobacco consumption may also be the contributory factors for this phenomenon.

Keywords: Analysis, Blood Pressure, Hypertention, Lipid Profile.

INTRODUCTION

There are a lot of apparent causes, some of them are linked to poor eating habits and alternative lifestyles. Although there is a strong correlation between stress and cardiovascular disease (CVD), the underlying mechanisms of this relationship are not well understood.According to recent estimates, 60 million Americans and many others around the world suffer from hypertension.According to recent studies, cardiovascular disorders have been the cause of 1.59 million fatalities in India, and this number is expected to rise in the future.3,4 Twenty-six percent of adults worldwide suffer from hypertension.5. The presence of hypertension is a stand-alone risk factor for cardiovascular illnesses and fatalities.Six Prehypertensive subjects are more likely to develop hypertension than those with lower blood pressure.7. Hypertension is defined as blood pressure greater than 140/90 mmHg in the seventh report of the Joint National Committee on the Prevention, Detection, Evaluation, and Treatment of Blood Pressure (JNC 7).8. "Prehypertension" is the term used to describe people whose blood pressure is higher than normal but not clinically hypertensive. The JNC 7 report defines prehypertension as having a systolic blood pressure (SBP) range of 120 to 139 mmHg and a diastolic blood pressure (DBP) range of 80 to 89 mmHg.8 This range of blood pressure was previously considered high normal. Many individuals who were previously regarded as normal have been placed in the high risk category once this range was classified as prehypertension. Thus, elevated blood lipid levels

indicate a higher risk of cardiovascular disease in individuals with prehypertension. Therefore, early identification of this abnormality and prompt treatment could stop the development of prehypertension into hypertension and shield those with the disease from its consequences. Our goal was to determine the lipid profile evaluation in prehypertensive and normotensive individuals, as well as the relationship between blood pressure and lipid profile in these patients.

MATERIALS AND METHODS

This present study was carried out in the department of Cardiology at NIMS, Jaipurin collaboration with the department of Medicine during the period from February 2018 to January 2019. Randomly, selected 100 patients which age in between 20-60 years and were categorized in two groups:

Group 1: 50 patient's prehypertensiveas cases.

Group 2: 50 subjects normotensive as controls.

Subjects with inclusion criteria as per 7th joint national committee on prevention, detection, evaluation and treatment of blood pressure defines prehypertension has –"Systolic blood pressure ranging between 120-139mmofHgand/or Diastolic blood pressure ranging between 80–89mmofHg".[8]Blood pressure was measured with the sphygmomanometer from the right arm of seated participant after five minutes rest and was recorded using 1st and 5thkorotkoff sounds. The appearance of 1stkorotkoff sound was taken as systolic blood pressure (SBP) and 5thkorotkoff sound was taken as diastolic blood pressure (DBP). Three blood pressure measurements were taken and the mean of the last two measurements were used for analysis. 5 ml of venous blood was collected after overnight fasting of 12 hrs in all the subjects for estimation of serum total cholesterol, HDL cholesterol, LDL cholesterol, VLDL cholesterol, and serum triglyceride by standard enzymatic method.

BIOCHEMICAL ANALYSIS

An overnight fast 5ml of venous blood samples was collected for following biochemical parameters to be studied.[14]

1. Total Cholesterol (TC) by enzymatic end point CHOD-POD methods.
2. Triglyceride (TG) by enzymatic glycerol phosphate oxidase/peroxidase methods.
3. HDL-Cholesterol by direct enzymatic end point method.
4. LDL-Cholesterol by Friedewald's formula. LDL-c = Tc-HDL-c(TG/5)

STATISTICAL ANALYSIS

All values were expressed as mean ± S.D. We used student-test and Pearson's corerelation coefficient to find the statistical significance. A P-value < 0.05 was to be considered statistically significant.

RESULTS

A comparative cross-sectional study was conducted to measure and compare the lipid profile among prehypertensives and normal subjects, as well as to determine the correlation between blood pressure and lipid profile among prehypertensives and normal subjects. The study included 50 cases with prehypertension and 50 cases with normal blood pressure. We looked at how prehypertensive and normotensive patients' lipid profiles were evaluated, as well as how blood pressure and lipid profile were correlated in these patients. Table 1

Table 1: Shows age distribution among prehypertension and normalsubjects:

Age in Years	Group-1	Group-2
20-25	1	3
25-30	3	20
30-35	6	14
35-40	5	1
40-45	14	8
45-50	15	4
50-55	6	0
55-60	0	0
60-65	0	0

When age, height, weight, and BMI were compared between the two groups, there was no discernible difference between them (p>0.05). Fundamental traits were similar between the two groups. (Table 2)

Table 2: Comparison of baseline variable between prehypertensives and normal.

Baseline variables	Prehypertensives	Normal	P value
Age in years	25.41 ± 6.2	27.72 ± 5.31	0.225
Height in Cm	171.21 ± 6.9	170.34 ± 7.2	0.138
Weightin Kg	66.71 ± 9.9	67.81 ± 11.21	67.81 ± 11.21
BMI(Kg/m2)	22.39 ± 2.51	22.91 ± 2.63	22.91 ± 2.63

The findings are displayed as Mean ± SD. At <0.05, the p-value is significant. Significant differences were found when the blood pressure readings of the two groups were compared. p < 0.001) (Table 3).

Table 3: Comparison of blood pressure value between prehypertensives and normal.

Blood pressure	Prehypertensives	Normal	P value
SBP	133.78 ± 4.67	117.21 ± 5.41	<0.001
DBP	87.69 ± 3.56	73.84 ± 5.65	<0.001

The data is displayed as Mean ± SD, with a significant p value of less than 0.05.

In prehypertensives, there is a strong and statistically significant positive connection ($p<0.014$) between total cholesterol and systolic blood pressure (Table 4). In prehypertensives, there is a statistically significant positive connection ($p<0.04$) between systolic blood pressure and triglycerides.

Table 4: Showing co-relation of Blood Pressure with lipid parameters

Parameters	Correlation Between SBP and Lipid profiles		Correlation Between DBP and Lipid profiles	
	r-value	p-value	r-value	p-value
TC (mg/dl)	0.598	0.015	0.431	0.017
TG (mg/dl)	0.389	0.05	0.366	0.04
LDL-c (mg/dl)	0.351	0.020	0.398	0.013
HDL-c (mg/dl)	-0.287	0.37	-0.482	0.37
VLDL-c(mg/dl)	0.678	0.002	0.627	0.001

Additionally, there was a statistically significant positive connection ($p<0.018$ & $p<0.002$) between LDL-c and VLDL-c and Systolic Blood Pressure. However, there was a statistically insignificant negative connection ($p<0.34$) between HDL-c and systolic blood pressure in the prehypertensive group. Similarly, DBP and lipid markers in prehypertensives showed statistically significant relationships, with the exception of HDL-c.

DISCUSSION

The current study compared the lipid profiles of normal and prehypertensive patients in order to establish a correlation between the two. Significantly higher levels of triglycerides, LDL C, VLDL C, and total cholesterol were linked to prehypertension when compared to normal. Prehypertensives have much lower HDL cholesterol values than the typical range. This unequivocally demonstrates that, in comparison to normal patients, prehypertensives are more likely to experience cardiovascular events. Worldwide recognition of hypertension as a significant risk factor for CVD, stroke, diabetes, and kidney disorders exists.9.Comorbidities include obesity, glucose intolerance, problems in lipid metabolism, and other conditions that affect about 80% of people with hypertension. The current study found that prehypertensive patients had significantly higher total cholesterol, triglycerides, LDL-c, and VLDL-c levels than normotensive patients. Hitesh A. Jani et al. and Ravi Venkatachalam et al. presented similar results.10,11 According to the current investigation, dyslipidemia and prehypertension are related. Prehypertensives showed significantly higher levels of total cholesterol, LDL, VLDL, and triglycerides, and significantly lower levels of HDL, according to a population study involving 1,544 participants.Eleven The American research also demonstrated the correlation between prehypertension and risk factors like obesity, diabetes mellitus, and hypercholesterolemia.Six research conducted on the Korean population revealed that prehypertensives have a higher risk of metabolic syndrome compared to normal people. Twelve The current study's findings corroborate the notion that prehypertensives have elevated serum lipid markers, with the exception of HDL. The association between prehypertensives and cardiovascular risk factors implies that individuals diagnosed with prehypertension ought to undergo additional screening for cardiovascular risk factors. This study confirms the findings of Hitesh a Jani et al., who found that SBP & DBP were greater in hypertensives, by demonstrating that the mean SBP and DBP of the prehypertensives group were higher than those of the normotensives group.10. However, we now understand that those who have prehypertension have a higher chance of cardiovascular events. Additionally, there is a higher chance that prehypertensives will develop hypertension. Prehypertensives are currently known to be at high risk of cardiovascular events, and research is starting to assess the potential role of medication in prevention.[12]

CONCLUSION

Lipid profile is altered in prehypertensives compare to normotensives. That's why timely diagnoses and life style modification is required inprehypertensives. So analysis of lipid profile in pre hypertensive individuals will serve as a useful tool for monitoring adverse cardiovascular outcomes. The higher level of serum TC, TG and LDL- cholesterol in the study population may be due to geneticfactorsandincreasedconsumptionofdietary animal fat, lack of physical exercise, metabolic disorders like diabetes mellitus and hypothyroidism, severe stress, increased age, sex as well as alcohol and tobacco consumption may also be the contributory factors for thisphenomenon.

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