



Original Research

The Relationship between Lipid Profile and Hypertension

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Abstract

Background: Hypertension and variations from the norm of lipid profile frequently coincide. Irregularities in serum lipid and lipoprotein levels are perceived major modifiable cardiovascular disease and basic hypertension hazard factors. The target of this investigation was to examine relationship between Lipid Profile and Hypertension.

Materials and Methods: Sixty recently diagnosed adult hypertensive patients and an equivalent number of age- and sex-coordinated controls without hypertension were continuously enlisted from the hospital in North India. Full history was taken, clinical examination was done and different laboratory examinations were carried for all people in the two groups which incorporates serum triglycerides (TG), total cholesterol (TC), High Density Lipoprotein (HDL), Low Density Lipoprotein (LDL). Height and weight were measured with the subject in light garments without shoes, and Body Mass Index (BMI) (Kg/m^2) was calculated.

Result: The mean age was (47.6 ± 7.5) year; (48.7 ± 6.4) year for hypertensive and control people. The hypertensive patients had essentially higher weight record than controls. All the lipid parts TC, TGL, LDL, VLDL, HDL were higher in the hypertensive patients than those in the sound controls. Most extreme occurrence of hypertension was seen in the age group 40-49 years. The triglyceride level was fundamentally higher in the male than female hypertensives.

Conclusion: This investigation demonstrated that lipid variations are highly prevalent among newly diagnosed hypertensives. There are biologic interrelations between BP and blood lipids that may impact the systems whereby blood pressure is related with danger of coronary heart disease.

Keywords: Blood pressure, Lipid profile, Hypertension.

Introduction

Abnormalities in serum lipid and lipoprotein levels (dyslipidemia) are perceived as major modifiable cardiovascular disease (CVD) risk factors and have been distinguished as

autonomous hazard factors for fundamental hypertension offering ascend to the term dyslipidemic hypertension.¹ Dyslipidemia is more typical in untreated hypertensives than normotensives, and lipid levels increase as BP

increases. In spite of the fact that no particular example of dyslipidemia has been reliably revealed among hypertensive people, many examinations have demonstrated that total cholesterol (TC), triglycerides (TG), and for all intents and purposes all parts of lipoproteins have a tendency to be more as often as possible strange among hypertensive patients than in the all inclusive community.²

Hypertension is known to be related with adjustments in lipid metabolism which offers abnormalities in serum lipid and lipoprotein levels. It has likewise been recorded that occurrence of hyperlipidaemia considerably exacerbates the prognosis in hypertensive patients. Recent examinations show that weakened endothelium-dependent vascular unwinding in patients with fundamental hypertension might be related with hypercholesterolemia and it has been recommended that low density lipoprotein (LDL) cholesterol in itself might be a modifiable hazard factor for hypertension.³ Additionally, increased sympathetic action or peripheral insulin resistance might be identified with hyperlipidemia in hypertension. Scarcely any endeavors have been made to examine the connection between BP and serum lipid levels or to survey the determinants inside a populace for this affiliation. A superior comprehension of the interrelation between BP and blood lipid levels might be of importance for the comprehension of how basic hypertension is identified with the etiology and pathogenesis of arteriosclerosis and, in this manner, additionally to select the suitable remedial approach.⁴

Recent reports demonstrate that borderline hypertension (systolic BP 130-139 as well as diastolic BP 85-89 mmHg) and Stage I hypertension convey a noteworthy cardiovascular hazard and there is a need to diminish this BP. The announced prevalence of hypertension changes far and wide, with the most minimal pervasiveness in rustic India (3.4% in men and 6.8% in women). There is additionally articulated impact of BP on the rate of atheroma formation in human subjects.

Isolated systolic hypertension regularly found in elderly subjects can be credited to atherosclerosis initiated solidifying of aorta and major arteries. Atherosclerosis is broad and serious in hypertensive people than in normotensive, was the conclusion after the post-mortem examination thinks about led on human coronary veins and aortas gathered from different parts of the world.⁵ Atheromas seem prior and most plenteous in the high-weight fragments of the course. So amid work up of hypertensive patients it is beneficial to examine for all hazard components of CAD, particularly lipid profile.⁶ Distinctive plasma lipids shift fundamentally in different populace bunches because of contrast in topographical, social, practical, social conditions, dietary propensities and hereditary makeup.

The blood pressure be that as it may, isn't the main determinant of cardiovascular damage and the penchant of hypertensive patients to create target organ harm is extraordinarily affected by coinciding danger factors, for example, age, sex, smoking, weight, diabetes, dyslipidemia and others.⁷ Among these elements lipoproteins are major to the atherosclerotic procedure and enormously influence the effect of hypertension on improvement of target organ harm and accordingly on cardiovascular mortality. Studies additionally recommend that pre hypertensives will probably advance to hypertension when contrasted with subjects with ordinary BP. The present study was conducted to assess the relationship between Lipid Profile and Hypertension.

Materials and Methods:

Sixty newly diagnosed adult hypertensive patients and an equal number of age- and sex matched controls without hypertension were consecutively recruited from the Civil Hospital, in North India were studied. It was a hospital-based cross-sectional study. Significant sociodemographic information and history were acquired, physical examination was done, and anthropometric estimations were taken amid subjects' initially

visits to the facilities. Rejection criteria were: patients with thyroid sickness, diabetes mellitus, renal ailments, oral preventative pills, steroids and lipid lowering, β blocker and thiazid drug.

Blood pressure was taken on the left arm following 5 minutes' unwinding, in a sitting position, utilizing a standard mercury sphygmomanometer with proper cuff measure; systolic (SBP) and diastolic (DBP) blood pressures compared to Korotkoff sounds 1 and V, individually. The mean of three readings, taken at first visit, was utilized for encourage investigation.

Height and body weight were measured with members remaining without shoes and other external articles of clothing. Body mass index (BMI) was ascertained as weight, divided by height squared (kg/m^2). Venipuncture was performed with the members in a sitting position; a tourniquet was utilized yet was discharged before inspecting. Following 30 minutes, the coagulated examples were centrifuged, the serum was exchanged to plastic tubes and were analysed inside 48 hours.

Total cholesterol level was measured specifically by the enzymatic oxidase method, utilizing a commercially available kit and HDL cholesterol was examined by a similar system after precipitation of lower density lipoproteins with heparin and manganese chloride. Non-HDL cholesterol level was figured as total cholesterol minus HDL cholesterol level. Triglycerides were enzymatically decided as glycerol. Members were analyzed about time since last dinner. The measurable examination was completed utilizing SPSS Software. The results of the study were expressed as mean \pm standard deviation (SD).

Result

The mean age was (47.6 ± 7.5) year; (48.7 ± 6.4) year for hypertensive and control people. The hypertensive patients had essentially higher weight record than controls. All the lipid parts TC, TGL, LDL, VLDL, HDL were higher in the hypertensive patients than those in the sound

controls. Most extreme occurrence of hypertension was seen in the age group 40-49 years. The triglyceride level was fundamentally higher in the male than female hypertensives.

Table no 1: Demographic details

Variables	Study group (n=60)	Control group (n=60)
Age (years)	47.6 ± 7.5	48.7 ± 6.4
Gender		
Male	41	37
Female	19	23
Weight (kg)	69.7 ± 8.5	65.3 ± 6.9
Height (cm)	169.6 ± 7.5	170.8 ± 6.8
BMI (kg/m^2)	24.71 ± 3.8	21.32 ± 4.2
SBP (mmHg)	162.6 ± 12.7	118.8 ± 11.6
DBP (mmHg)	98.7 ± 9.4	72.7 ± 8.5

Table 2: Mean level of serum lipoproteins

Parameters	Study group (n=60)	Control group (n=60)
Total Cholesterol (mg/dl)	203.5 ± 15.8	156.9 ± 17.80
Triglyceride (mg/dl)	174.92 ± 21.7	123.71 ± 23.91
HDL- Cholesterol (mg/dl)	43.78 ± 4.61	46.7 ± 4.32
LDL- Cholesterol (mg/dl)	139.16 ± 22.4	103.75 ± 16.8

Table 3: Prevalence of serum lipid abnormality

Lipid abnormality	Study group (n=60)	Control group (n=60)
Elevated TC (> 5.2 mmol/L)	48 (81%)	7 (12%)
Elevated LDL (> 3.4 mmol/L)	39 (65%)	10 (17%)
Elevated TG (> 1.7 mmol/L)	11 (19%)	2 (3%)
Low HDL-C (<1.04 mmol/L)	29 (48%)	19 (32%)

Elevated TC was the most frequently occurring abnormality among the hypertensive subjects, $n = 48$ (81%) followed by elevated LDL $n = 39$ (65%). These abnormalities however often occurred together with other lipid abnormalities rather than in isolation.

Discussion

"Hypertension" continues to be one of the most common diseases treated by physicians.

Ongoing research has better defined the mechanisms and clinical characteristics for this

condition and enlarged the score of therapeutic options. It is increasingly clear that high blood pressure although an independent risk factor for adverse clinical events frequently exists as a part of a syndrome of cardiovascular neuroendocrine and metabolic abnormality.

Epidemiological studies have established a strong association between hypertension and Coronary Artery Disease (CAD). Hypertension results are from a complex interaction of genes and environmental factors.⁸ Several environmental factors influencing blood pressure – diet, increased salt intake, lack of exercise, obesity, stress, depression, Vitamin D deficiency play a role in individual cases. As such HT can be considered as a preventable risk factor for premature deaths worldwide. 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.⁹ The present study revealed a significant relationship between dyslipidemia and hypertension. The mean value of serum cholesterol, triglycerides, and LDL are significantly higher while the serum levels of HDL are significantly lower in hypertensive patients than control group.

The present study consisted of a large population of men and women with a broad age range, which allowed a detailed analysis of the association between total cholesterol level and blood pressure. The consistent positive relation between blood pressure and cholesterol level within population strata suggests that there is a biological interrelation between the two major coronary heart disease risk factors. The results show that differences in total cholesterol levels are not confined to comparisons of "hypertensive" versus "normotensive" subjects but that there are graded and continuous interrelations throughout the usual range of blood pressure in this population. This study has shown that the prevalence of Hypertension is highest in age group 40-49 years

of Males and Females. Several studies in both developed and developing countries have consistently shown a positive relationship between age and blood pressure.^{10,11} The significantly higher plasma total cholesterol, triglycerides and LDL-cholesterol in the hypertensive than in the normotensive patients in the present study is in corroboration with earlier studies.¹²⁻¹⁵

Bonna K.H, Thelle D.S (1991) have 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.¹⁶ Low physical activity and consumption of diet with more of carbohydrates and saturated fatty acids such as fast-food have been associated with hyperlipidemia.¹⁷ According to Dancy habitually active men and women are less likely to have hyper triglycerides and less HDL concentration. The positive correlation between lipid profile and BMI, and HT were in collaboration with previous studies and reaffirmed the role of lipids in the pathophysiology of overweight and obesity as well as increased accumulation of lipids with age.¹⁸

Conclusion

Advanced age and increased BMI were more likely to develop hypertension and it is seen to be more prevalent in males compare to females. Lipid profile is altered in prehypertensives compare to normotensives. That's why timely diagnoses and life style modification is required in prehypertensives.

References

1. W. B. Kannel, W. P. Castelli, T. Gordon, and P. M. McNamara, "Serum cholesterol, lipoproteins, and the risk of coronary heart disease. The Framingham study," *Annals*

- of Internal Medicine, vol. 74, no. 1, pp. 1–12, 1971.
2. R. R. Williams, S. C. Hunt, P. N. Hopkins et al., “Familial dyslipidemic hypertension. Evidence from 58 Utah families for a syndrome present in approximately 12% of patients with essential hypertension,” *Journal of the American Medical Association*, vol. 259, no. 24, pp. 3579–3586, 1988
 3. Saha MS, Sana NK, and RanajitKS. Serum lipid profile of 6. hypertensive patients in the northern region of Bangladesh . *J bio sci*2006 , 14: 93- 8.
 4. Lepirl FB, M’buyamba-Kabangu J.R, Kayembe KP, et 7. al. Correlates of serum lipids and lipoproteins in Congolese patients with arterial hypertension. *Cardiovasc J south Afr*. 2005; 16: 249-55.
 5. Bravo EL: Metabolic factors and the sympathetic nervous system. *Am J Hypertens* 1989;2:339S-344S
 6. Reaven GM, Hoffman BB: Hypertension as a disease of carbohydrate and lipoprotein metabolism. *Am J Med* 1989; 87:2S-6S
 7. Thelle DS, FØrde OH, Try K, Lehmann EH: The Troms heart study: Methods and main results of the cross-sectional study. *Acta Med Scand* 1976;200:107-118
 8. Sacks FM, Dzau VJ: Adrenergic effects on plasma lipoprotein metabolism: Speculation on mechanisms of action. *Am J Med* 1986;80(suppl 2A):71-81
 9. Day JL, Metcalfe J, Simpson CN: Adrenergic mechanisms in control of plasma lipid concentrations. *Br Med J* 1982;284: 1145-1148
 10. Singh RB, Beegom R, Ghosh S, Niaz MA, Rastogi V. Epidemiological study of hypertension and its determinants in an urban population of North India. *J Hum Hypertens* 1997; 11: 679-685.
 11. Whelton PK. Epidemiology of hypertension. *Lancet* 1994; 344: 101-106.
 12. Youmbissi TJ, Djoumessi S, Nouedoui C. Profile lipidique d’un group d’hypertendus camerounais noir Africains. *Medicine d’Afrique Noire* 2001; 31: 114-118.
 13. Ahaneku JE, Nwosu MC, Ahaneku GI, Okugba PC. Utilisation of Clinical chemistry tests with special reference to lipid profile in disease management in a Nigeria setting. *East Afr Med J* 1999; 76:172-175.
 14. Mgonda YM, Ramaiya KL, Swai ABM, Mc-Larty DG, George KM, Alberti M. Insulin resistance and hypertension in non-obese Africans in Tanzania. *Hypertension* 1998; 31: 114-118.
 15. Jarikre AE, Dim DC, Ajuluchukwu JNA. Plasma lipid levels in Nigerian hypertensives: the gender factor. *Nig Qtr J Hosp Med* 1996; 6: 293-298. Kaare II.
 16. Bonaa. Dag S. Association between blood pressure and serum lipids in a population- The Tromso Circulation 1991:83 (4): 1305-13.
 17. Kelishadi R, Alikhani S, Delavari A, Alaedini F, Safaie A, Hojatzadeh E. Obesity and associated lifestyle behaviours in Iran: Findings from the national non-communicable disease risk factor surveillance survey. *Public Health Nutr*. 2008; 11:246-51
 18. Dancy C, Lohnsoonthorn V, Williams MA. Risk of dyslipidemia in relation to level of physical activity among Thai professional and office workers. *Sutheast Asian J Trop Med Public Health*. 2008; 39:932-41.