

Original Research

Relationship between hypertension and serum lipid profile levels in normotensive and hypertensive Patients

¹Pankaj Bohra, ²Amitesh Nagrwal

¹Associate Professor, ²Assistant Professor, Department of Cardiology, National Institute of Medical Sciences & Research, Jaipur, Rajasthan, India

ABSTRACT:

Introduction: There is a strong relationship between total LDL cholesterol concentrations and CVD risk. Patterns of lipid abnormalities among Asians and their relative impact on cardiovascular risk have not been well characterized. **Materials & Methods:** Blood pressure and lipid profile including total cholesterol (TC), triglyceride (TG), low density lipoprotein (LDL), and high density lipoprotein (HDL) were recorded. All the participants were aged between 30–60 years. Participants were selected consecutively from the outpatient department by the attending physician. After obtaining oral and written informed consent, data was collected through face-to-face interviews, clinical examinations and blood tests for serum lipid profile by trained research assistants. **Results:** The mean systolic blood pressure and diastolic blood pressure of the hypertensive participants were 155 ± 7.71 and 99 ± 10.61 respectively, which were higher than normotensives. The mean age of normotensives and hypertensive patients were 41.21 ± 7.90 and 55.11 ± 10.50 years, respectively. **Conclusion:** Our results suggest that elevated BP may predict certain disturbances in lipoprotein metabolism.

Keywords: lipoprotein metabolism, blood Pressure, hypertension

Received: 08 December, 2020

Accepted: 11 January, 2021

Corresponding author: Amitesh Nagrwal, Assistant Professor, Department of Cardiology, National Institute of Medical Sciences & Research, Jaipur, Rajasthan, India

This article may be cited as: Bohra P, Nagrwal A. Relationship between hypertension and serum lipid profile levels in normotensive and hypertensive Patients. J Adv MedDent Scie Res 2021;9(2): 170-173.

INTRODUCTION

Untreated hypertensives are more likely than normotensives to have dyslipidemia, and lipid levels rise with blood pressure.¹⁻²

It is well recognised that changes in lipid metabolism, which result in anomalies in blood lipid and lipoprotein levels, are linked to hypertension. Additionally, it has been shown that people with hypertension have a significantly worse prognosis when they have hyperlipidemia.³

Globally, cardiovascular disease (CVD) is the primary cause of mortality and disability, and dyslipidemia is linked to the vast majority of CVD cases. Serum lipid profile levels vary widely throughout various population groups globally. There is evidence linking elevated serum levels of TC, TG, LDL, and reduced HDL to significant CVD risk factors. High blood pressure (BP) is typically linked to dyslipidemia, which includes an altered ratio of high TC level and isolated evaluation of the LDL or TG levels. The risk

of CVD is strongly correlated with total LDL cholesterol concentrations. It is unclear how Asians' lipid abnormalities relate to cardiovascular risk and what patterns they exhibit.⁴

These nations have been referred to as bearing a "double burden of disease" due to the present trend of rising incidence and prevalence of non-communicable diseases such as hypertension, cardiovascular disease, and others, as well as the continued high rates of communicable diseases in the majority of developing nations.⁵

Globally, cardiovascular disease (CVD) is the primary cause of mortality and disability, and dyslipidemia is linked to the vast majority of CVD cases. Serum lipid profile levels vary widely throughout various population groups globally. There is evidence linking elevated serum levels of TC, TG, LDL, and reduced HDL to significant CVD risk factors. High blood pressure (BP) is typically linked to dyslipidemia, which includes an altered ratio of high TC level and

isolated evaluation of the LDL or TG levels. The risk of CVD is strongly correlated with total LDL cholesterol concentrations. It is unclear how Asians' lipid abnormalities relate to cardiovascular risk and what patterns they exhibit. Six Regardless of LDL levels, low HDL is becoming more widely acknowledged as a separate risk factor for unfavourable CVD outcomes. We lack comprehensive data on the true prevalence of low HDL-cholesterol among patients getting treatment for dyslipidemia, despite the fact that occasional reports indicate that the condition is quite common.⁷ These findings firmly imply that low HDL is a serious issue from a clinical standpoint.

Red meat and saturated fat intake are recognised risk factors for CVD, particularly hypertension.⁸ There are, however, few data in the literature about the association between lipid profile and hypertension in individuals from Bangladesh. The aim of the research was to evaluate the relationship between lipid profile and hypertension by comparing the blood lipid levels of hypertensive patients with those of normotensive control participants.

MATERIAL AND METHODS

The patients were divided into two groups as normotensive controls and hypertensive group. Blood pressure and lipid profile including total cholesterol (TC), triglyceride (TG), low density lipoprotein (LDL), and high density lipoprotein (HDL) were recorded. All the participants were aged between 30–60 years. Participants were selected consecutively from the outpatient department by the attending physician.

EXCLUSION CRITERIA

1. Patients with features of Cardiac, renal or hepatic complications or major medical problems.
2. Patients on lipid lowering and antihypertensive

medications.

After obtaining oral and written informed consent, data was collected through face-to-face interviews, clinical examinations and blood tests for serum lipid profile by trained research assistants. An informed signed consent was needed to be recruited into the study and those who refused were not recruited into the study. BP was measured by a physician after the patient had rested for 10 minutes. Blood pressure was taken on the left arm after 5 minutes' relaxation, in a sitting position, using a standard mercury sphygmomanometer with appropriate cuff size; systolic (SBP) and diastolic (DBP) blood pressures corresponded to Korotk off sounds I and V, respectively. The average of three readings, taken at first visit, was used for further analysis.

DATA ANALYSIS

Data were analyzed using Statistical Package for Social Sciences software, version 16.0 (SPSS Inc., Chicago, IL, USA). Descriptive statistics was used to present the demo-graphic characteristics of the study participants. Continuous variables were presented as mean-standard deviation (SD) and were compared using independent group Student's *t*-tests. Binary logistic regression analysis was performed to measure the relationship of lipid profile among the hypertensive and normotensive patients after adjusting for age, BMI, sex, and BP. *P*-value ≤ 0.05 was considered statistically significant.

RESULTS

The hypertension participants had mean systolic blood pressure of 155 ± 7.71 and diastolic blood pressure of 99 ± 10.61 , respectively, which were greater than those of the normotensive participants. The average age of patients with hypertension was 55.11 ± 10.50 years, while that of patients with normotension was 41.21 ± 7.90 years.

TABLE 1: MEAN TOTAL CHOLESTROL

PARAMETER	N=160	MEAN	P VALUE
T.Cholestrol	Normotensive	163.10±34.11	0.0001
	Hypertensive	190.71±31.40	

TABLE 2: MEAN TRIGLYCERIDE

PARAMETER	N=160	MEAN	P VALUE
TGL	Normotensive	117.71±15.12	0.03
	Hypertensive	133.3±20.11	

TABLE 3: MEAN LDL

PARAMETER	N=160	MEAN	P VALUE
LDL	Normotensive	96.03±10.71	0.002
	Hypertensive	116.51±12.41	

TABLE 4: MEAN HDL

PARAMETER	N=160	MEAN	P VALUE
HDL	Normotensive	46.31±9.71	0.001
	Hypertensive	36.31±9.10	

TABLE 5: CORRELATION OF SERUM LIPIDS LEVELS WITH INCREASED SYSTOLIC BP.

Variables tested for correlations	Pearsons correlation(P-value)
Triglycerides	0.01
Total Cholesterol	0.021
LDL	0.014
HDL	0.05

DISCUSSION

Comorbid conditions like obesity, glucose intolerance, and abnormalities in lipid metabolism affect about 80% of people with hypertension. Blood pressure and serum lipid have a constant positive relationship across population strata, indicating a biological relationship between the two. We looked into the connection between each participant's serum lipid profile and hypertension in this study. The study's findings showed that, in comparison to people with normotension, hypertension patients had considerably higher mean values for serum total cholesterol, triglycerides, and LDL. This is consistent with research conducted by Chobanian AV et al. (2010) and Osuji CU et al. (2015). It is well recognised that having high blood cholesterol raises the risk of macrovascular problems like coronary heart disease (CHD) and stroke.

Eleven The current investigation shows a substantial correlation between hypertension and dyslipidemia. It could cause coronary heart disease to develop. In our investigation, normotensives' mean HDL values were considerably greater than those of hypertension participants. Osuji CU et al. and Lakhshankumar N et al. noted similar results. Twelve The two main risk factors for CVD, coexisting in 15%–31% of cases, are hypertension and dyslipidemia. These risk factors negatively impact the vascular endothelium, which amplifies atherosclerosis and causes cardiovascular disease (CVD). Serum lipid abnormalities have been found to be a significant modifiable risk factor for CVD and essential hypertension, which gives birth to the term dyslipidemia-hypertension.

Thirteen Coexisting risk factors have a significant impact on the possibility that patients with hypertension, who have uncontrolled blood pressure, will experience damage to target organs. Hypertension alone is not the sole cause of cardiovascular system damage. Among them, lipoproteins have a major role in the development of target organ injury and, consequently, cardiovascular morbidity and mortality, as well as being strongly linked to the atherosclerotic process.

Fourteen Multiple interventions, including pharmaceutical and dietary ones, are necessary for the management of these illnesses, especially in high-risk patients.

In this study, we looked into the connection between hypertension and the serum lipid profile in a Bangladeshi metropolitan population. The study's findings showed that, in comparison to normotensives, the mean serum levels of TC, TG, and LDL were significantly higher and statistically

significant in hypertension individuals. Comparing hypertensives to normotensives, the mean HDL level was statistically significantly lower in the former group.

Worldwide recognition of hypertension as a significant risk factor for CVD, stroke, diabetes, and kidney disorders exists. Sixteen Comorbidities include obesity, glucose intolerance, problems in lipid metabolism, and other conditions that affect about 80% of people with hypertension. Similar to our investigation, a prospective study conducted in the northern part of Bangladesh compared the lipid profile status of hypertension patients to that of healthy normotensive controls and discovered elevated serum levels of TC, TG, and LDL. Our results, which show elevated TC levels in hypertension individuals, are consistent with those of certain other investigations. Few research, meanwhile, have examined the substantial correlation between dyslipidemia and hypertension in Bangladeshi people.

CONCLUSION

The results of this study demonstrate that patients with hypertension are more likely than normotensive patients to exhibit dyslipidemia, including elevated TC, LDL, TG, and reduced HDL cholesterol levels. Our results suggest that elevated BP may predict certain disturbances in lipoprotein metabolism. This association will help to develop future strategies for preventing both hypertension and dyslipidemia through proper lifestyle changes or medical management or by the combination of both. Hypertensive patients need measurement of BP and lipid profile at regular intervals throughout their primary health care to prevent CVD and stroke.

REFERENCES

1. Borghi C. Interactions between hypercholesterolemia and hypertension: implications for therapy. *Current Opinion in Nephrology and Hypertension*. 2002;11(5):489–496.
2. Neaton JD and Wentworth D. Serum cholesterol, blood pressure, cigarette smoking, and death from coronary heart disease: overall findings and differences by age for 316 099 white men. *Archives of Internal Medicine*. 1992;152(1):56–64.
3. Harvey JM and Beevers DG. Biochemical investigation of hypertension. *Annals of Clinical Biochemistry*. 1990;27(4):287–296.
4. Karthikeyan G, Teo KK, Islam S, McQueen MJ, Pais P, Wang X. Lipid profile, plasma apolipoproteins, and risk of a first myocardial infarction among Asians: an analysis from the INTERHEART Study.

- JAmCollCardiol.2009;53(3):244–253.
5. Osuji CU, Omejua EG, OnwubuyaEI and AhanekuGI.SerumLipidProfileofNewlyDiagnosedHypertensive Patients in Nnewi, South-East Nigeria.Hindawi Publishing Corporation International Journalof Hypertension Volume 2012, Article ID 710486, 7pages.
 6. Karthikeyan G, Teo KK, Islam S, et al. Lipid profile, plasma apolipoproteins, and risk of a first myocardial infarction among Asians: an analysis from the INTERHEART Study. *J Am Coll Cardiol*. 2009;53(3):244–253.
 7. Bruckert E, Pamphile R, McCoy F, André P. Defining the prevalence of low HDL-C in a European cohort of dyslipidaemic patients. *Eur Heart J Supplements*. 2005;7(Suppl F):F23–F26.
 8. Teo K, Lear S, Islam S, et al; PURE Investigators. Prevalence of a healthy lifestyle among individuals with cardiovascular disease in high-, middle- and low-income countries: The Prospective Urban Rural Epidemiology (PURE) study. *JAMA*. 2013;309(15):1613–1621.
 9. Choudhury KN, Mainuddin AK, Wahiduzzaman M, Islam SM. Serum lipid profile and its association with hypertension in Bangladesh. *Vasc Health Risk Manag*. 2014;10:327–332.
 10. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL. “The seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: the JNC 7 report,” *Journal of the American Medical Association*. 2003;289(19):2560–2572.
 11. Albuchoer JF, Ferrieres J, Ruidavets JB, Guiraud Chaumeil B, Perret BP, and Chollet F. Serum lipids in young patients with ischaemic stroke: a case-control study. *Journal of Neurology Neurosurgery and Psychiatry*. 2000;69(1):29–33.
 12. Lakhshankumar N, Deepthi J, Rao YN, Kiran Deedi M. Study of lipid profile, serum magnesium and blood glucose in hypertension. *Biol Med* 2010;2(1):6–16.
 13. Gebrie A, Gnanasekaran N, Menon M, Sisay M, Zegeye A. Evaluation of lipid profiles and hematological parameters in hypertensive patients: Laboratory-based cross-sectional study. *SAGE Open Med*. 2018;6:2050312118756663.
 14. Srinivaspai K, Bhagoji SB and Biswas A. A study on the lipid profile of hypertensive patients in Mangalore. *Int J Pharmaceut Sci Bus Manag* 2014;2:1–10.
 15. Osuji CU, Omejua EG, OnwubuyaEI and AhanekuGI.SerumLipidProfileofNewlyDiagnosedHypertensive Patients in Nnewi, South-East Nigeria.Hindawi Publishing Corporation International Journalof Hypertension Volume 2012, Article ID 710486, 7pages.
 16. Saha MS, Sana NK, Shaha RK. Serum lipid profile of hypertensive patients in the northern region of Bangladesh. *J Bio-Sci*. 2006;14:93–98.
 17. Islam AK, Majumder AA. Hypertension in Bangladesh: a review. *Indian Heart J*. 2012;64(3):319–323.
 18. Anjum R, Zahra N, Rehman K, et al. Comparative Analysis of Serum Lipid Profile between Normotensive and Hypertensive Pakistani Pregnant Women. *J Mol Genet Med*. 2013;7:64.
 19. Bambara R, Mittal Y, Mathur, A. Evaluation of Lipid Profile of North Indian Hypertensive Subjects. *Asian Journal of Biomedical and Pharmaceutical Sciences*. 2013;3:38–41.