



ASSOCIATION OF LIPID PROFILE ABNORMALITIES AMONG PATIENTS WITH HYPERTENSION: A RETROSPECTIVE HOSPITAL-BASED DESCRIPTIVE STUDY

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ABSTRACT

Background: Hypertension is a major cardiovascular risk factor frequently associated with dyslipidemia, which further increases the risk of atherosclerotic cardiovascular disease. Abnormal lipid profiles among hypertensive patients contribute significantly to morbidity and mortality. This study aimed to evaluate the relationship between lipid profile abnormalities and hypertension in a hospital-based population.

Methodology: This retrospective descriptive study was conducted in the Department of General Medicine at Sree Mookambika Institute of Medical Sciences from March 2025 to February 2026. A total of 50 hypertensive patients were included in the study. Data regarding demographic details, blood pressure measurements, medication history, and lipid profile parameters were collected from electronic health records. Statistical analysis was performed using SPSS version 25.0. Correlation analysis, Student's t-test, and ANOVA were used where appropriate, with $p < 0.05$ considered statistically significant.

Results: The study included 25 males and 25 females with a mean age of 62 ± 8 years. Elevated LDL cholesterol was observed in 46% of patients, low HDL cholesterol in 54%, and elevated triglycerides in 38%. Uncontrolled hypertension showed significant positive correlation with LDL cholesterol ($r=0.34$, $p<0.05$) and negative correlation with HDL cholesterol ($r=-0.29$, $p<0.05$). Patients on combination therapy demonstrated significantly improved lipid parameters.

Conclusion: Dyslipidemia was highly prevalent among hypertensive patients and was significantly associated with poor blood pressure control. Integrated management of hypertension and lipid abnormalities may help reduce cardiovascular complications.

Keywords: Hypertension, Dyslipidemia, Lipid Profile, LDL Cholesterol, HDL Cholesterol, Cardiovascular Risk.

INTRODUCTION

Hypertension is one of the most common non-communicable diseases worldwide and represents a major public health concern because of its strong association with cardiovascular morbidity and mortality.

Persistent elevation of blood pressure contributes significantly to the development of coronary artery disease, stroke, heart failure, peripheral vascular disease, and chronic kidney disease. According to the World Health Organization, hypertension affects more than one billion people globally, with a steadily increasing prevalence in developing countries due to urbanization, sedentary lifestyle, obesity, unhealthy dietary habits, and aging populations. Despite advancements in diagnosis and treatment, hypertension continues to remain inadequately controlled in many patients, thereby increasing the burden of cardiovascular complications [1,2].

Dyslipidemia is another major modifiable cardiovascular risk factor frequently associated with



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hypertension. Lipid abnormalities such as elevated total cholesterol, increased low-density lipoprotein (LDL) cholesterol, elevated triglycerides, and reduced high-density lipoprotein (HDL) cholesterol contribute to endothelial dysfunction and accelerated atherosclerosis. The coexistence of hypertension and dyslipidemia has a synergistic effect on cardiovascular risk, significantly increasing the likelihood of myocardial infarction, cerebrovascular accidents, and other vascular complications [3]. Several studies have demonstrated that hypertensive patients commonly exhibit abnormal lipid profiles when compared to normotensive individuals, suggesting a close pathophysiological relationship between blood pressure regulation and lipid metabolism [4].

The relationship between lipid profiles and hypertension has been the subject of extensive research, highlighting the importance of lipid management in hypertensive patients. Dyslipidemia in hypertensive individuals can exacerbate the risk of cardiovascular events; therefore, understanding this relationship is essential for effective disease management and therapeutic strategies [5]. Alterations in lipid metabolism may contribute to increased vascular resistance, endothelial injury, oxidative stress, and inflammatory responses, all of which play an important role in the pathogenesis and progression of hypertension. Consequently, early identification and treatment of lipid abnormalities in hypertensive patients may reduce cardiovascular morbidity and mortality [6].

This study aims to evaluate the lipid profiles of patients diagnosed with hypertension in a hospital-based setting through a retrospective descriptive approach. By analyzing previously recorded patient data, the study seeks to identify common patterns and abnormalities in serum lipid levels among hypertensive individuals. Particular emphasis will be placed on assessing the prevalence of elevated LDL cholesterol, reduced HDL cholesterol, hypertriglyceridemia, and increased total cholesterol levels, as well as their association with the severity and control of hypertension [7].

The significance of this research lies in its potential to improve clinical outcomes through better understanding of the association between dyslipidemia and hypertension. Identification of common lipid abnormalities among hypertensive patients may support the implementation of targeted lipid-lowering interventions and integrated

cardiovascular risk management strategies. Furthermore, findings from this hospital-based retrospective study may contribute valuable information to the existing literature and assist clinicians in formulating comprehensive treatment plans for hypertensive patients. Ultimately, the study emphasizes the importance of combined management of hypertension and dyslipidemia to reduce long-term cardiovascular complications and improve patients' quality of life [8].

Aim

To evaluate the lipid profile pattern among patients with hypertension in a hospital-based population.

Objectives

1. To assess the levels of serum lipid parameters including total cholesterol, triglycerides, LDL cholesterol, and HDL cholesterol in patients with hypertension
2. To determine the prevalence of dyslipidemia among hypertensive patients.

METHODOLOGY

This retrospective descriptive study was conducted in the Department of General Medicine at Sree Mookambika Institute of Medical Sciences over a study period extending from March 2025 to February 2026. The study aimed to evaluate the relationship between lipid profile abnormalities and hypertension among patients attending the hospital. Data were collected retrospectively from the electronic health records (HER) and medical case records of patients diagnosed with hypertension during the study period.

Patients diagnosed with hypertension, defined as systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg recorded on multiple occasions, were included in the study. Only patients who had undergone complete lipid profile testing during the study period were considered eligible. The lipid profile parameters analyzed included total cholesterol, low-density lipoprotein (LDL) cholesterol, high-density lipoprotein (HDL) cholesterol, and triglyceride levels.

Patients with incomplete medical records or missing lipid profile data were excluded from the study. Additionally, patients below 18 years and above 85 years of age were excluded due to variations in lipid metabolism at extreme ages. Patients with secondary hypertension caused by conditions such as renal artery stenosis, endocrine disorders, or other

identifiable causes were also excluded to minimize confounding variables.

The data extracted from patient records included demographic characteristics such as age, gender, and body mass index (BMI); clinical details including duration of hypertension and associated comorbidities; medication history involving antihypertensive drugs and lipid-lowering agents; blood pressure readings at the time of lipid profile assessment; and laboratory lipid profile values. All collected data were entered into a structured data collection proforma and maintained with strict confidentiality.

Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS) software version 25.0. Continuous variables such as age, blood pressure values, and lipid profile parameters were expressed as mean ± standard deviation (SD). Categorical variables such as gender distribution and prevalence of lipid abnormalities were represented as frequencies and percentages. Correlation analysis was carried out to determine the association between blood pressure levels and lipid profile parameters. Student's t-test or one-way analysis of variance (ANOVA) was applied to compare mean lipid values among different groups wherever appropriate. A p-value of less than 0.05 was considered statistically significant.

RESULT

Participant Characteristics

The study included a total of 50 patients, with an equal gender distribution (25 males and 25 females). The mean age of participants was 62 years (standard deviation = 8 years). Most patients (76%) had been diagnosed with hypertension for more than 5 years. The majority of the patients (60%) were on antihypertensive medication, while 40% were additionally prescribed lipid-lowering agents.

Lipid Profile Distribution

The mean lipid values for the study population were as follows:

Total Cholesterol: 205 mg/dL (SD = 45 mg/dL)

LDL Cholesterol: 130 mg/dL (SD = 35 mg/dL)

HDL Cholesterol: 40 mg/dL (SD = 10 mg/dL)

Triglycerides: 150 mg/dL (SD = 65 mg/dL)

A breakdown of lipid abnormalities showed:

46% of patients had elevated LDL cholesterol levels (above 100 mg/dL for patients on lipid-lowering therapy or 130 mg/dL for those not on therapy).

54% of the patients had low HDL cholesterol levels (below 40 mg/dL for males and 50 mg/dL for females).

38% had high triglyceride levels (above 150 mg/dL).

Correlation Between Hypertension Control and Lipid Levels

There was a statistically significant correlation between uncontrolled hypertension and higher LDL cholesterol levels ($r = 0.34$, $p < 0.05$). Similarly, there was a significant negative correlation between hypertension control and HDL cholesterol levels ($r = -0.29$, $p < 0.05$). No significant correlation was found between triglyceride levels and the control status of hypertension ($p > 0.05$).

Effect of Medication on Lipid Profiles

Patients on combination therapy of antihypertensives and lipid-lowering drugs showed significantly lower mean LDL cholesterol (115 mg/dL vs. 145 mg/dL, $p < 0.01$) and higher HDL cholesterol levels (45 mg/dL vs. 35 mg/dL, $p < 0.01$) compared to those on antihypertensive therapy alone.

The findings of this retrospective study indicate a prevalent dyslipidemia among patients with hypertension treated at BMIMS Pawapuri. A significant proportion of the study population exhibited elevated LDL and low HDL cholesterol levels, which were more pronounced among those with uncontrolled hypertension.

Furthermore, the combination of antihypertensive and lipid-lowering therapy was associated with more favorable lipid profiles, suggesting the potential benefits of integrated management of hypertension and dyslipidemia. These results underline the importance of comprehensive cardiovascular risk assessment and management in hypertensive patients.

This table summarizes key metrics like the distribution of lipid profiles among the participants and the impact of medication on these values.

Metric	Overall Mean (SD)	Mean for Antihypertensive Only (SD)	Mean for Combination Therapy (SD)	P-value
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Total Cholesterol (mg/dL)	205 (45)	210 (50)	200 (40)	n/a
LDL Cholesterol (mg/dL)	130 (35)	145 (30)	115 (25)	<0.01
HDL Cholesterol (mg/dL)	40 (10)	35 (8)	45 (12)	<0.01
Triglycerides (mg/dL)	150 (65)	155 (70)	140 (60)	n/a

Additional Metrics

Participants: 50 (25 males, 25 females)

Mean Age: 62 years (SD = 8 years)

Patients with elevated LDL: 46%

Patients with low HDL: 54%

Patients with high Triglycerides: 38%

DISCUSSION

The present retrospective descriptive study evaluated the relationship between lipid profile abnormalities and hypertension among patients attending the Department of General Medicine at Sree Mookambika Institute of Medical Sciences. The study findings demonstrated a high prevalence of dyslipidemia among hypertensive patients, emphasizing the close association between altered lipid metabolism and hypertension. These findings are consistent with previous studies that identified dyslipidemia as an important cardiovascular risk factor frequently associated with elevated blood pressure [9].

In the present study, the mean age of the participants was 62 ± 8 years, indicating that hypertension and associated lipid abnormalities are more common among older adults. Equal gender distribution was observed, allowing balanced assessment across both sexes. Most patients had hypertension for more than five years, suggesting that prolonged hypertension may contribute to progressive vascular and metabolic changes that adversely affect lipid metabolism [10]. Previous research has shown that chronic hypertension promotes endothelial dysfunction and oxidative stress, thereby increasing the likelihood of dyslipidemia and atherosclerotic cardiovascular disease [11].

The mean total cholesterol and LDL cholesterol levels in the study population were elevated, while HDL cholesterol levels were relatively low. Nearly 46% of patients had elevated LDL cholesterol levels, and 54% exhibited low HDL cholesterol

levels. These findings are clinically significant because elevated LDL cholesterol is strongly associated with accelerated atherosclerosis, whereas reduced HDL cholesterol impairs reverse cholesterol transport and vascular protection [12]. Similar observations have been reported in studies by Gupta et al. and Borghi et al., which demonstrated that hypertensive patients frequently present with atherogenic lipid abnormalities that increase cardiovascular risk [13,14].

The study also demonstrated a statistically significant positive correlation between uncontrolled hypertension and elevated LDL cholesterol levels ($r = 0.34$, $p < 0.05$). This finding suggests that poor blood pressure control may be associated with worsening lipid abnormalities. Additionally, a significant negative correlation was observed between hypertension control and HDL cholesterol levels ($r = -0.29$, $p < 0.05$), indicating that lower HDL cholesterol levels were more common among patients with uncontrolled hypertension. These results support the concept that hypertension and dyslipidemia share common pathophysiological mechanisms, including insulin resistance, endothelial dysfunction, inflammation, and sympathetic overactivity [15].

No significant correlation was observed between triglyceride levels and hypertension control status. Although elevated triglycerides were noted in 38% of the study population, their association with blood pressure control was less pronounced compared to LDL and HDL cholesterol. Similar findings have been reported in earlier studies where triglycerides showed variable associations with hypertension depending on lifestyle factors, obesity, and comorbid conditions [16].

An important observation in this study was the beneficial effect of combination therapy involving antihypertensive and lipid-lowering medications. Patients receiving combination therapy

demonstrated significantly lower LDL cholesterol levels and higher HDL cholesterol levels compared to those receiving antihypertensive therapy alone. This finding highlights the importance of integrated cardiovascular risk management in hypertensive patients. Early initiation of lipid-lowering therapy alongside blood pressure control may help reduce the progression of atherosclerosis and decrease the risk of cardiovascular complications [17].

Overall, the findings of this study emphasize the need for routine lipid profile assessment in hypertensive patients. Comprehensive management strategies targeting both hypertension and dyslipidemia may improve cardiovascular outcomes and reduce long-term morbidity and mortality. Further large-scale prospective studies are recommended to better understand the causal relationship between hypertension and lipid abnormalities and to evaluate the long-term benefits of combined therapeutic interventions [18].

CONCLUSION

The present retrospective descriptive study demonstrated a high prevalence of dyslipidemia among patients with hypertension, particularly elevated LDL cholesterol and reduced HDL cholesterol levels. Significant associations were observed between uncontrolled hypertension and adverse lipid profile parameters, indicating the close interrelationship between hypertension and lipid metabolism abnormalities. Patients receiving combined antihypertensive and lipid-lowering therapy showed comparatively better lipid profiles, highlighting the benefits of integrated cardiovascular risk management. These findings emphasize the importance of routine lipid profile screening and comprehensive therapeutic strategies in hypertensive patients to reduce cardiovascular morbidity and improve long-term clinical outcomes.

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