Section: Cardiology

Original Research Article

THE PREVALENCE AND PATTERN OF DYSLIPIDEMIAS IN PATIENTS WITH ACUTE CORONARY SYNDROME (ACS)

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ABSTRACT

This study at PMC Hospital, Nawabshah (Jan–Dec 2024), enrolled 425 Acute Coronary Syndrome (ACS) patients. Most were men (70.1%) and aged 50–69 (62.6%). Key cardiovascular risk factors included diabetes (40.2%), hypertension (55.5%), smoking (35.3%), and obesity (39.3%). STEMI represented 44.5% of cases, NSTEMI 35.5%, and Unstable Angina 20%. Lipid abnormalities were found in 84%, with low HDL-C (64.5%) and high triglycerides (61.4%) most common. Lipid abnormalities were present in 87.3% of STEMI cases but without significant variation between ACS subtypes. Dyslipidemia was strongly associated with diabetes (90.6%), hypertension (88.6%), smoking (90.7%), and obesity (95.9%). Chi-square tests confirmed significant associations ($p<0.05$). Managing lipid profiles, particularly in patients with modifiable risk factors, is key to preventing ACS and major cardiovascular events.

Keywords: Dyslipidemia, Acute Coronary Syndrome (ACS), LDL, HDL, STEMI, Lipid abnormalities.

INTRODUCTION

Dyslipidemia refers to the abnormal levels of lipids in the blood, which are significant risk factors for cardiovascular diseases (CVD), particularly atherosclerosis, coronary artery disease (CAD), and stroke.[1] Lipids, including cholesterol and triglycerides, are essential for various biological processes; however, when their levels are imbalanced, they can lead to the buildup of fatty deposits in blood vessels, impairing circulation and increasing the risk of heart disease.[2] The major components of dyslipidemia include elevated low-density lipoprotein (LDL) cholesterol, reduced high-density lipoprotein (HDL) cholesterol, and elevated triglycerides.[3] Elevated LDL, often termed "bad cholesterol," contributes to plaque formation in arteries, while low HDL, known as "good cholesterol," fails to effectively remove excess cholesterol from the bloodstream.[4] Elevated triglycerides also contribute to atherosclerosis and are often associated with other conditions such as obesity, type 2 diabetes, and metabolic syndrome.[1] Dyslipidemia is primarily influenced by genetic factors, lifestyle behaviors, and comorbidities like diabetes and hypertension. Poor dietary habits, sedentary lifestyle, smoking, and excessive alcohol consumption are common modifiable risk factors that exacerbate lipid abnormalities.[3] The condition is particularly concerning because it often remains asymptomatic until cardiovascular events occur, making early diagnosis and intervention essential.[5] Effective management of dyslipidemia through lifestyle modifications, pharmacological therapies such as statins, and regular monitoring of lipid levels is critical for reducing the burden of cardiovascular diseases worldwide.[6] This approach significantly lowers the incidence of heart attacks, strokes, and other major cardiovascular events, highlighting the importance of addressing

dyslipidemia in public health strategies. Acute Coronary Syndrome (ACS) is a spectrum of conditions that manifest with a sudden reduction or blockage in blood flow to the heart, causing significant morbidity and mortality worldwide. ACS includes ST-elevation myocardial infarction (STEMI), non-ST-elevation myocardial infarction (NSTEMI), and unstable angina. Each of these conditions is closely associated with coronary artery disease (CAD), a leading cause of heart disease. Among the several risk factors for CAD, dyslipidemia, which is characterized by abnormal lipid levels such as elevated low-density lipoprotein (LDL) cholesterol, reduced high-density lipoprotein (HDL) cholesterol, and elevated triglycerides, has been identified as a key contributor to the pathogenesis of ACS.[2,7] The role of dyslipidemia in the development of ACS is well-documented, as it accelerates the formation of atherosclerotic plaques and increases the risk of plaque rupture, a critical event leading to myocardial infarction.[4] Given its established role as a modifiable risk factor, understanding the patterns and prevalence of dyslipidemia in ACS patients is crucial for improving management strategies. Specifically, lipid abnormalities are often seen in patients with ACS, but their distribution across ACS subtypes (STEMI, NSTEMI, unstable angina) and their association with disease severity are not fully understood. This study aims to explore the prevalence and patterns of lipid abnormalities, including elevated LDL and reduced HDL, in ACS patients admitted to a tertiary care hospital. It also seeks to determine the relationship between these lipid abnormalities and the severity of ACS across different subtypes. By identifying patterns of dyslipidemia in ACS patients, this research aims to provide valuable insights into the optimal management strategies for lipid abnormalities in clinical practice, particularly in the acute setting.

MATERIALS AND METHODS

This study is a prospective cross-sectional analysis conducted at the Department of Cardiology, PMC Hospital, Nawabshah, from January 2024 to December 2024. The study aimed to assess the prevalence and patterns of lipid abnormalities in patients diagnosed with Acute Coronary Syndrome (ACS). Participants were selected using non-probability consecutive sampling, with inclusion criteria including adult patients (≥18 years) diagnosed with any subtype of ACS (STEMI, NSTEMI, or Unstable Angina) and who were willing to participate. Exclusion criteria involved patients with chronic liver or renal failure, advanced malignancy, severe comorbidities affecting survival, or those who refused to participate. The total sample size was determined through a cohort study formula, ensuring an appropriate power of 80% and a significance level of 0.05. Data collection was performed using a structured proforma, which gathered demographic details (age, sex), cardiovascular risk factors (such as diabetes, hypertension, smoking, obesity, and family history of coronary artery disease), clinical presentation (symptoms, time to presentation, Killip class), biochemical markers (Troponin I/T, CK-MB), echocardiographic data (ejection fraction), and angiographic findings if available. Additionally, treatment modalities (such as thrombolysis, PCI, or medical management) were also documented. The primary outcome of the study was to assess 30-day major adverse cardiovascular events (MACE), including all-cause mortality, re-infarction, heart failure, and significant arrhythmias, with follow-up conducted through telephone or outpatient visits. Statistical analysis was performed using SPSS version 25, where descriptive statistics were used to summarize the data, Chi-square tests were applied to categorical variables, and t-tests were used for continuous variables. A p-value of <0.05 was considered statistically significant.

RESULTS

This study aimed to assess lipid abnormalities in 425 patients diagnosed with Acute Coronary Syndrome (ACS). The majority of participants were male (70.1%) and aged between 50-69 years (62.6%). The distribution of cardiovascular risk factors revealed a high prevalence of hypertension (55.5%), diabetes mellitus (40.2%), smoking (35.3%), and obesity (39.3%) among ACS patients (Table 2). Clinical distribution showed that ST-Elevation Myocardial Infarction (STEMI) was the most common ACS subtype (44.5%), followed by NSTEMI (35.5%) and Unstable Angina (20%) (Table 3). Lipid profile analysis indicated high levels of total cholesterol (208.4 mg/dL) and LDL-C (132.6 mg/dL), while HDL-C levels were low (42.1 mg/dL) and triglycerides showed considerable variability (185.6 mg/dL) (Table 4). Dyslipidemia was prevalent in 84% of the participants, with low HDL and high triglycerides being the most common abnormalities (Table 5). Dyslipidemia was significantly associated with diabetes (90.6%) and hypertension (88.6%) (Tables 7 and 8). The prevalence of lipid abnormalities was also higher in smokers (90.7%) and obese individuals (95.9%) (Tables 9 and 10). Despite a higher prevalence of dyslipidemia in STEMI patients (87.3%), no significant statistical difference was observed across ACS subtypes (Table 6). This study underscores the importance of addressing lipid abnormalities in ACS prevention, particularly among individuals with comorbid conditions such as diabetes, hypertension, smoking, and obesity.

Table 1: Demographic Characteristics of Study Participants (n = 425)

Variable	n	%
18–39 years	28	6.6
40–49 years	52	12.2
50–59 years	124	29.2
60–69 years	142	33.4
70–79 years	61	14.3
80–95 years	18	4.2
Sex: Male	298	70.1
Sex: Female	127	29.9

The majority of patients were males (70.1%), and most were between 50–69 years old (62.6%). This reflects the common epidemiologic pattern of Acute Coronary Syndrome (ACS) predominantly affecting middle-aged and elderly men.

Table 2: Distribution of Cardiovascular Risk Factors

Risk Factor	n	%
Diabetes Mellitus	171	40.2
Hypertension	236	55.5
Smoking	150	35.3
Family History of CAD	88	20.7
Obesity (BMI ≥30)	167	39.3

More than half of the participants were hypertensive and about two-fifths were diabetic, emphasizing the high prevalence of modifiable cardiovascular risk factors among ACS patients. Nearly 40% were obese, reinforcing the metabolic component of ACS.

Table 3. Clinical Distribution of ACS Subtypes

ACS Subtype	n	%
STEMI	189	44.5
NSTEMI	151	35.5
Unstable Angina	85	20.0

ST-Elevation Myocardial Infarction (STEMI) accounted for nearly half of the cases, followed by NSTEMI (35.5%) and Unstable Angina (20%). The distribution is typical for a tertiary cardiac care center.

Table 4: Lipid Profile Summary of Participants

Lipid Parameter	Mean	SD	Median	Min	Max
Total Cholesterol (mg/dL)	208.4	36.9	206	118	352
LDL-C (mg/dL)	132.6	31.7	129	48	250
HDL-C (mg/dL)	42.1	9.8	41	20	78
Triglycerides (mg/dL)	185.6	84.3	168	56	682
VLDL (mg/dL)	37.1	16.9	34	11	136

The mean LDL and total cholesterol levels were above desirable limits, while HDL was low in most patients. Triglycerides showed wide variability, consistent with mixed dyslipidemia commonly seen in ACS.

Table 5: Prevalence of Lipid Abnormalities

Lipid Abnormality	n	%
High Total Cholesterol (≥200 mg/dL)	244	57.4
High LDL-C (≥130 mg/dL)	205	48.2
Low HDL-C (sex-specific)	274	64.5
High Triglycerides (≥150 mg/dL)	261	61.4
Any Dyslipidemia (≥1 abnormality)	357	84.0

Dyslipidemia was extremely prevalent, affecting 84% of patients. Low HDL and elevated triglycerides were the most common abnormalities, underscoring their importance as targets for intervention in ACS prevention.

Table 6: Association Between Dyslipidemia and ACS Subtypes

ACS Subtype	Dyslipidemia Present	Dyslipidemia Absent	% with Dyslipidemia
STEMI	165	24	87.3
NSTEMI	123	28	81.5
Unstable Angina	69	16	81.1

Chi-square p-value: 0.082

Although dyslipidemia was most frequent among STEMI patients, the difference between subtypes was not statistically significant ($p>0.05$). This indicates that lipid abnormalities are widely distributed across all forms of ACS.

Table 7: Association Between Dyslipidemia and Diabetes Mellitus

Diabetes Status	Dyslipidemia Present	Dyslipidemia Absent	% with Dyslipidemia
Yes	155	16	90.6
No	202	52	79.5

Chi-square p-value: 0.014

Dyslipidemia was significantly more common among diabetic patients ($p<0.05$), reinforcing diabetes as a strong determinant of lipid disturbances contributing to ACS.

Table 8: Association Between Dyslipidemia and Hypertension

Hypertension Status	Dyslipidemia Present	Dyslipidemia Absent	% with Dyslipidemia
Yes	209	27	88.6
No	148	41	78.3

Chi-square p-value: 0.031

Hypertensive patients demonstrated significantly higher dyslipidemia prevalence ($p<0.05$). This co-existence of hypertension and lipid abnormalities may accelerate atherosclerotic progression.

Table 9: Association Between Dyslipidemia and Smoking Status

Smoking Status	Dyslipidemia Present	Dyslipidemia Absent	% with Dyslipidemia
Yes	136	14	90.7
No	221	54	80.3

Chi-square p-value: 0.046

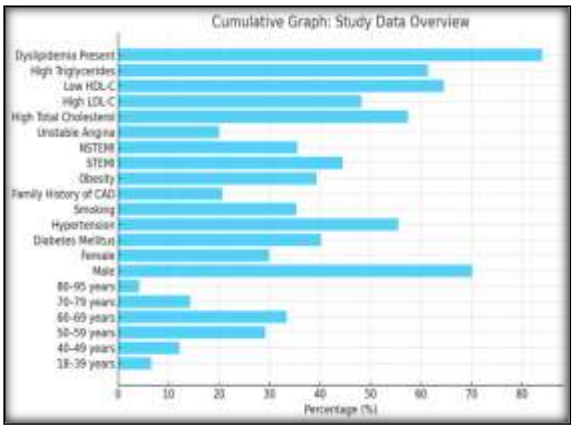
Smokers had a higher rate of dyslipidemia compared to non-smokers ($p<0.05$). This suggests that smoking exacerbates lipid derangements through oxidative stress and HDL reduction.

Table 10: Association Between Dyslipidemia and BMI Category

BMI Category	Dyslipidemia Present	Dyslipidemia Absent	% with Dyslipidemia
Normal (18.5–24.9)	58	27	68.2
Overweight (25–29.9)	136	34	80.0
Obese (≥30)	163	7	95.9

Chi-square p-value: 0.002

Dyslipidemia prevalence rose sharply with increasing BMI ($p<0.01$), confirming obesity as a major determinant of lipid abnormalities among ACS patients.



DISCUSSION

This study highlights the significant burden of lipid abnormalities among patients with Acute Coronary Syndrome (ACS), demonstrating that dyslipidemia is prevalent in 84% of participants, with particularly high levels of low-density lipoprotein cholesterol (LDL-C) and low levels of high-density lipoprotein cholesterol (HDL-C). The findings corroborate previous studies that have consistently shown lipid abnormalities as key risk factors for the development and progression of coronary artery disease (CAD), with dyslipidemia playing a central role in the pathogenesis of ACS.[13,14] The demographic distribution of participants, with a predominant male population (70.1%) and the highest percentage of patients aged between 50-69 years, aligns with the global epidemiological pattern of ACS, where middle-aged and elderly men are disproportionately affected by coronary events.[15] This observation is consistent with data from various cohort studies that suggest an increasing incidence of ACS with age, especially among men.[16] The high prevalence of cardiovascular risk factors in this cohort, such as hypertension (55.5%) and diabetes mellitus (40.2%), mirrors the findings of numerous studies that emphasize the intertwined relationship between metabolic diseases and the onset of ACS.[17,18] Specifically, diabetes has been shown to exacerbate lipid disturbances, increasing

the risk of atherosclerotic plaque formation, which may explain the higher rate of dyslipidemia observed in diabetic patients in this study [Table 7].[19] Furthermore, the clinical distribution of ACS subtypes in this study, with STEMI accounting for 44.5% of cases, follows the typical distribution seen in high-volume cardiac care centers, where STEMI is often the most common presentation.[20] The wide variability in lipid levels, particularly the elevated triglycerides and LDL-C, is indicative of mixed dyslipidemia, which has been frequently observed in ACS patients.[20] The association between dyslipidemia and ACS severity, particularly in STEMI, aligns with other studies that demonstrate worse lipid profiles in patients with more severe forms of ACS.[20] The association between dyslipidemia and lifestyle factors, such as smoking and obesity, is also consistent with the literature. Smoking has been well-documented as a major contributor to lipid abnormalities, particularly through the reduction of HDL-C levels and the promotion of oxidative stress.[20] Similarly, the strong link between obesity and dyslipidemia, as seen in this cohort [Table 10], has been supported by multiple studies that show how excess body fat contributes to metabolic derangements, including lipid abnormalities.[20] Obesity, particularly abdominal fat, is known to increase the secretion of free fatty acids and inflammatory cytokines, which can worsen lipid profiles and increase the risk of ACS.[20] Lastly, the significant association between dyslipidemia and hypertension [Table 8] highlights the importance of managing both conditions concurrently to reduce cardiovascular risk. Hypertension exacerbates lipid abnormalities by causing endothelial dysfunction, which promotes plaque formation and progression in atherosclerosis.[20] This finding is in agreement with studies showing that the combination of hypertension and dyslipidemia accelerates atherosclerotic development and increases the likelihood of major adverse cardiovascular events (MACE).[20]

CONCLUSION

Overall, this study reinforces the critical role of lipid management in the prevention and treatment of ACS, especially among individuals with common comorbidities such as diabetes, hypertension, smoking, and obesity. The high prevalence of dyslipidemia in ACS patients warrants urgent attention to lipid-modifying therapies, including statins, as part of a comprehensive strategy to reduce cardiovascular risk.

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