

# Pattern of Dyslipidemia in Patients with Acute Coronary Syndrome in a Cardiac Hospital of Central Nepal

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## ABSTRACT

**Background:** Dyslipidemia is defined as an abnormal concentration of lipids in the blood and is a critical modifiable risk factor for the development of cardiovascular diseases, including acute coronary syndrome (ACS). The aim of the study was to determine the pattern of dyslipidemia among patients with Acute Coronary Syndrome admitted to a cardiac hospital.

**Methods:** A cross-sectional study was conducted among 143 patients admitted to Chitwan Mutu Aspatal with a diagnosis of acute coronary syndrome. The study was conducted from July 2021 to Jan 2024 over a period of 2.5 years. The patient's lipid levels were taken within 24 hours from the onset of Acute Coronary Syndrome.

**Results:** Out of total of 143 patients, dyslipidemia was found in majority of patients with low HDL in 92(64.30%) in our study. 53 (37.1%) were females and 90 (62.9%) were males. The mean age of the patients was 62.30±13.03 SD (in years). Patients with STEMI had maximum elevation of LDL (52.9%) compared with those having NSTEMI in 44.4% and 31% in Unstable angina patients. Also, low HDL level was detected in the majority of the patients across all spectrum of ACS patients which was statistically significant ( $p<0.05$ ).

**Conclusion:** There is a higher prevalence of low HDL-C and high prevalence of LDL-C among the Nepalese population presenting with acute coronary syndrome (ACS) in the hospital.

**Keywords:** *dyslipidemia; pattern; acute coronary syndrome.*

## INTRODUCTION

Dyslipidemia is defined as an abnormal concentration of lipids in the blood and is a critical modifiable risk factor for the development of cardiovascular diseases, including acute coronary syndrome (ACS). The interplay between dyslipidemia and ACS is well-established, as abnormal lipid profiles contribute significantly to the pathogenesis of atherosclerosis, leading to acute events such as myocardial infarction and unstable angina.<sup>1</sup> The clinical manifestations of myocardial ischemia, including unstable angina, non-ST-segment elevation myocardial infarction, and ST-segment elevation myocardial infarction, are together referred to as acute coronary syndrome (ACS). A partially or intermittently occluded coronary artery typically causes unstable angina and NSTEMI, while a fully occluded coronary artery causes STEMI.<sup>2</sup> Dyslipidemia is a major modifiable risk factor for CVD attributing to approximately 4 million CVD-related deaths across the globe.<sup>3</sup> Primary dyslipidemia can be inherited as an autosomal dominant, autosomal recessive, or

X-linked. Secondary dyslipidemia is due to physical inactivity, unhealthy nutrition, obesity, diabetes, hypothyroidism, chronic kidney disease, liver disease, alcohol abuse, smoking, and the use of certain drugs.<sup>4</sup> In the current era, ~20% of ACS survivors experience a subsequent ischemic cardiovascular event within 24 months, and 5-year mortality ranges from 19% to 22%.<sup>5</sup> A study concluded that LDL is not merely a biomarker of increased risk but a causal factor in the pathophysiology of ACS.<sup>6</sup> Thus, this study is conducted to determine the prevalence of dyslipidemia in patients suffering from ACS in a cardiac hospital in Nepal.

## METHOD

A cross-sectional study was designed in Chitwan Mutu Aspatal from July 2021 to Jan 2024 over a period of 2.5 years. Consent was obtained from the patients before the data collection. Comprehensive clinical examination was performed, and the patient's lipid levels were measured within 24 hours after the patient presented to the emergency room with acute coronary syndrome (ACS). Lipid assay was done

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with Enzymatic Colorimetric Test for TC and TG with lipid Clearing Factor. LDL-C was determined by direct method and HDL-C by precipitation method. An electrocardiogram (ECG), Troponin I/CPK-MB and other relevant investigations were evaluated on all patients at presentation and the case was classified as Unstable Angina (UA), Non-ST Elevation MI (NSTEMI), and ST Elevation MI (STEMI). Dyslipidemia was defined and noted when the lipid values did not fall in the range of normal values as defined in Table 1.

**Table 1. Normal levels of lipid profile.<sup>3</sup>**

Lipids	Normal range
Total Cholesterol	< 200 mg/dl
TG	45-165 mg/dl
LDL	< 100 mg/dl
HDL	>40 mg/dl
VLDL	3-32 mg/dl

The main lipid parameters considered were total cholesterol, (TC), total triglycerides (TG), low-density lipoprotein cholesterol (LDL), high-density lipoprotein cholesterol (HDL), and very low-density lipoprotein cholesterol (VLDL).

## RESULTS

The study included a total of 143 patients. In the study, 53 (37.1%) were females and 90 (62.9%) were males. The mean age of the patients was 62.30±13.03 SD (in years). Out of the total number of cases, 27 (18.9 %) had NSTEMI, 87 (60.8 %) had STEMI, and 29 (20.3 %) had Unstable Angina. The baseline characteristics of the patients are as shown in Table 2.

**Table 2. Baseline characteristics of patients with acute coronary syndrome.**

Age (in years)	Frequency (%)
30-50	23(16.1)
51-70	75(52.4)
71-90	45(31.5)
Mean±SD	62.30±13.03
<b>Sex</b>	
Female	53(37.1)
Male	90(62.9)
<b>Diagnosis</b>	
ACS	143(100)
NSTEMI	27(18.9)
STEMI	87(60.8)
Unstable Angina	29(20.3)

Overall, it has been observed that patients with ACS suffered from some form of dyslipidemia either hyper or hypolipidemia as illustrated in Table 3.

**Table 3. Pattern of lipid profile among ACS patients.**

Lipid Profile	Mean±SD	Normal	Abnormal
Total Cholesterol	176.94 ±53.97	99(68.2)	44(30.8)
Triglycerides (TG)	180.11±25.90	75(52.4)	68(47.6)
LDL	102.27±30.02	76(53.1)	67(46.9)
HDL	43.99±11.01	51(35.7)	92(64.3)
VLDL	36.006±12.13	75(52.4)	68(47.6)

In our study, patients with STEMI and Unstable angina had highest prevalence of dyslipidemia(58.62%) as shown in Table 4.

**Table 4. Pattern of Dyslipidemia in Patients with Different Types of ACS.**

Diagnosis	Total	Normal	Abnormal
NSTEMI	27	12 (44.44%)	15 (55.56%)
STEMI	87	36 (41.38%)	51 (58.62%)
Unstable Angina	29	12 (41.38%)	17 (58.62%)

Acute coronary syndrome patients with STEMI had maximum elevation of LDL (52.9%) compared with LDL elevation in 44.4% in NSTEMI and 31% in Unstable angina patients. Also, low HDL level was detected in the majority of the patients across all spectrum of ACS patients which was statistically significant ( $p<0.05$ ) as shown in Table 5.

## DISCUSSION

Out of 143 patients in our study, 53 (37.1%) were females and 90 (62.9%) were males. The mean age of the patients was 62.30±13.03 SD (in years). Out of the total number of cases, 27 (18.9 %) had NSTEMI, 87 (60.8 %) had STEMI, and 29 (20.3 %) had Unstable Angina. Similar prevalence was noted in a study by Dhungana et al<sup>7</sup> (Nepal) and Muneeb et al<sup>8</sup>(Pakistan). According to our study, 64.3% and 46.9% of patients presenting to the emergency room with ACS had some sort of dyslipidemia, either low HDL or high LDL respectively, which suggests that there is a correlation between dyslipidemia and ACS. Similarly, a study done in a tertiary care center in Nepal found that dyslipidemia was present in 48.6 % of their cases.<sup>9</sup> Also, a similar study in Pakistan found the prevalence of dyslipidemia in 83.2% of their cases.<sup>8</sup> It can be observed that statistically no

Variables	Total cholesterol		TG		LDL		HDL		VLDL	
	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal
NSTEMI	19(70.4)	8(29.6)	15(55.6)	12(44.4)	15(55.6)	12(44.4)	4(14.8)	23(85.2)	12(55.6)	12(44.4)
STEMI	55(63.2)	32(36.8)	46(52.9)	41(47.1)	41(47.1)	46(52.9)	31(35.6)	56(64.4)	46(52.9)	41(47.1)
Unstable Angina	25(86.2)	4(13.8)	14(48.3)	15(51.7)	20(69)	9(31)	16(55.2)	13(44.8)	14(48.3)	15(51.7)
Chi-square	5.41		0.31		4.24		9.92		0.31	
p-value	0.067		0.855		0.12		0.007		0.855	

difference was found in the type of ACS and the lipid profile except low HDL level prevalence which was statistically significant in our study ( $p < 0.05$ ). It was similar to other studies from different parts of the world. In our study, the most commonly observed lipid abnormality was low HDL followed by higher elevation of TG, VLDL, LDL and TC. Previous studies on CAD patients also found similar results regarding the presence of high levels of TC, LDL-C, and TG and low levels of HDL-C.<sup>10,11</sup> The lower prevalence of high LDL-C as compared to other fractions is consistent with previous study which showed a higher prevalence of low LDL levels among Asians.<sup>12,13</sup> Our study showed low HDL-C levels in a high percentage of patients (64.3%) as shown in the previous study which revealed that South Asians had lower HDL-C levels than rest of the other population.<sup>12</sup> All types of ACS are equally likely attributed due to dyslipidemia as the major risk factor. However, other risk factors (eg. smoking, hypertension, diabetes, family history etc.) are very likely to be as deterministic in the

causation of ACS and its various types. Dyslipidemia is an independent major risk factor for CAD. Studies have reported a higher prevalence of dyslipidemia among Asians compared to the western population.<sup>10</sup> A combination of low HDL-C and high TG referred to as atherogenic dyslipidemia, have been implicated as important predictors of CAD.<sup>14,15</sup> Apolipoprotein measures (Apo B and Apo AI) were not calculated in our study which are strongly associated with the risk of MI in South Asians. This is a limitation to our study.

## CONCLUSION

There is a higher prevalence of low HDL-C and high prevalence of LDL-C among the Nepalese population presenting with acute coronary syndrome (ACS) in the hospital. These categories of patients with ACS need high intensity statin treatment along with therapeutics to increase HDL-C. Also, modification of other risk factors for acute coronary syndrome remains vital.

**Conflict of interest:** None

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