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Myocardial Infarction amongst the patients presenting with chest pain in an Emergency Department of a Tertiary Care Hospital in Western Nepal: A descriptive cross-sectional study

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ABSTRACT

Introduction: Chest pain is one of the symptoms which bring patient to the Emergency Department. Myocardial infarction is the most significant clinical presentation of Acute Coronary Syndrome and cause of morbidity and mortality among the global population. This study aims to identify the occurrence of Myocardial Infarction and investigate its relationships with demographic and cardiac risk factors, and characteristics of chest pain.

Methods: A prospective cross-sectional study was carried out among 113 patients in the Emergency Department of Manipal Teaching Hospital, Nepal. For categorical variables, descriptive statistics, including frequency and percentage, were presented. The Chi-square test, Independent Samples Test were employed for inferential analysis. A p-value of less than 0.05 was considered to be as significant.

Results: Among 113 patients who attended with chest pain, 31 patients had a myocardial infarction. Age, gender and occupation showed no significant association in Myocardial Infarction Troponin-positive patients also had a higher prevalence of smoking and dyslipidemia, although it was not statistically significant in our study. Nonetheless, cardiovascular disease was of significant association with myocardial infarction (p=0.004). ECG results showed a close correlation with MI where 62.9 % of troponin-positive patients reported STEMI (p<0.0001). The most common abnormality in NON-STEMI patients was T-wave inversion (61.5%).

Conclusions: Myocardial infarction was frequent occurrence in patients who reported chest pain in this tertiary care unit. The study indicates that combining clinical history, risk factor evaluation, ECG interpretation, and cardiac biomarkers are significant in early diagnosis and management of MI.

Keywords: *Chest pain, Electrocardiography, Myocardial infarction, Nepal, Troponin*

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INTRODUCTION

Chest pain is one of the symptoms in the emergency department indicating acute coronary syndrome (ACS) [1]. One of the most common manifestations of ACS is Myocardial infarction (MI), associated with a high level of morbidity and mortality rates [2]. The ischemic chest pains are usually substernal, pressure-like or squeezing, and usually extend to the left shoulder, neck, or arm, accompanied by shortness of breath. Early identification of MI is crucial as prompt treatment can lessen the complication and enhance survival [3].

MI diagnosis is done through a clinical history, electrocardiography (ECG), and cardiac biomarkers. Patients are categorized into ST-segment elevation myocardial infarction (STEMI), non–ST-segment elevation myocardial infarction (NSTEMI), or other acute ischemic cardiac events [4]. STEMI is characterized by 1 mm ST elevation in at least two of the leads of the ECG and special age-dependent and sex-specific thresholds exist that apply to lead V2-V3 [5]. Troponin I and T are sensitive and specific biomarkers that continue for a maximum of 7 days and peak approximately 12 hours after onset and CPK-MB is also useful in early detection. These diagnostic tools provide the opportunity to identify precisely MI and guide immediate management and therapeutic action.

The pain in the chest is distinguished as typical, atypical, and nonspecific. Studies have demonstrated that a subset of patients with ACS patients may present with atypical chest pain [6]. MI is closely related to conventional risk factors of cardiovascular diseases which include age, sex, diabetes, hypertension, smoking, and family history [7]. This study aims to focus on identifying the occurrence of MI in patients that present with chest pain to the emergency department and investigate its relationships with demographic and cardiac risk factors, and characteristics of chest pain.

METHODS

This study was a prospective hospital cross-sectional study in the Department of Emergency Medicine, Manipal Teaching Hospital, Pokhara, Nepal. All the patients who reported chest pain in the Emergency Department within the study period (Feb 2025 to Aug 2025) were considered the study population. As a tertiary care facility in Western Nepal, Manipal Teaching Hospital offers

emergency care to an extensive population of individuals, which makes it a suitable place to conduct research on myocardial infarction and other causes of acute chest pain.

All patients aged 18 and over who came with complaints of chest pain were included in this study. Meanwhile, patients who were critically ill, trauma patients, below 18 years and those who did not give consent were excluded.

Samples were collected from Emergency department of Manipal teaching hospital. Patients presenting with chest pain were evaluated and the study variables were collected in a proforma during history taking, physical examination, and from imaging.

Minimum required sample size was determined using the formula $n=Z^2pq/e^2$ where z=1.96, p=-0.08 [8], q=1-p, and e=0.05. The estimated sample size was 112.8, which was rounded off to a sample population of 113 participants.

This study received ethical approval from the Institutional Review Committee of MCOMS, Pokhara (IRC/MCOMS/625/GA). Verbal consent was taken from every participant prior to data collection. The information was stored confidentially and utilized in the research only. Data were collected and entered using SPSS version 26 software. For categorical variables, descriptive statistics, including frequency and percentage, were presented. Mean, standard deviation was used to represent numerical data. The Chi-square test and fisher exact was employed for inferential analysis. Independent Samples Test was applied to compare between two independent groups. A p-value of less than 0.05 was considered to be as significant.

RESULTS

Among 113 study population 35(31.0%) of the cases were Myocardial Infarction, while 78(69.0 %) patients presented with other causes of chest pain.

The mean age of the patients with myocardial infarction was 60.7±17.3. Majority of the patients 22(62.9%) were male and 13(37.1%) were female. Regarding the occupation 22(62.9%) of the patients were unemployed while 13(37.1%) of the patient were employed. (Table 1).

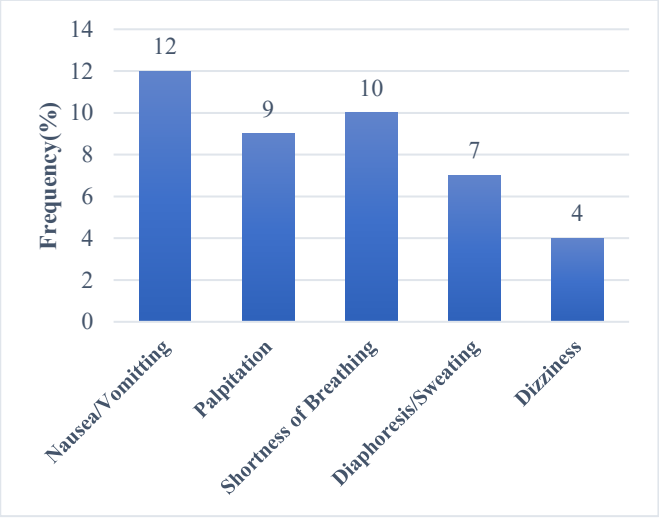
Table 1. Distribution of the demographic characteristics of study patients among myocardial infarction(n=35)

Indicators	Frequency	Percent (%)
Age (Mean±SD)	60.7±17.3	
Sex		
Female	13	37.1%
Male	22	62.9%
Occupation		
Unemployed	22	62.9%
Employed	13	37.1%

Among the 35 patients who had myocardial infarction, majority of them presented nausea and vomiting (N/V) with 12(34.3%) patients, it was followed by shortness of breath in 10(28.6%) patients, palpitation in 9(25.7%) patients, diaphoresis in 7(20.0%) patients and dizziness in 4(11.4%) patients. (Figure 1)

Among the 113 patients, 79(70.5%) were non-smokers and 33(29.5%) were smokers. Smoking was more common among patients with positive troponin levels, with 14 (40.0%) compared to 19 (24.7%) among those with negative troponin, the differences observed was not statistically significant (p=0.099).

Figure 1. Symptoms profile of patients with positive Troponin (n=35)



A significant association was observed with family history (p=0.004). Among troponin positive patients 8(22.9%) had a positive family history of cardiac disease compared to only 3(3.9%) in the troponin negative group.

Regarding dyslipidaemia, 6(17.1%) of the troponin positive patients and 9 (11.8%) of the troponin negative patients had the condition showing no significant difference between the groups (p=0.448).

For miscellaneous factors which consisted of past history, alcohol and hypertension, 20(57.1%) were at the troponin positive group compared to 43(55.1%) in the troponin negative group. The

association had no statistical significance (p=0.842). (Table 3).

Table 2. Association of risk factors with Troponin I (n=113)

Indicators	Troponin		Total	P-value *
	Negative (N=78)	Positive (N=35)		
Smoking				0.099
No	58 (75.3%)	21 (60.0%)	79 (70.5%)	
Yes	19 (24.7%)	14 (40.0%)	33 (29.5%)	
Family History				0.004
No	74 (96.1%)	27 (77.1%)	101 (90.2%)	
Yes	3 (3.9%)	8 (22.9%)	11 (9.8%)	
Dyslipidaemia				0.448
No	67 (88.2%)	29 (82.9%)	96 (86.5%)	
Yes	9 (11.8%)	6 (17.1%)	15 (13.5%)	
Miscellaneous				0.842
No	35 (44.9%)	15 (42.9%)	50 (44.2%)	
Yes	43 (55.1%)	20 (57.1%)	28 (25.2%)	

Fisher Exact Test, Chi-Square Test*

Among 113 patients 22(19.5%) were diagnosed with ST-elevation myocardial infarction (STEMI). All cases of STEMI were observed exclusively in the troponin-positive group, with 22 patients (62.9%) showing ST-elevation. The absence of ST-elevation was noted in all 78(100.0%) troponin negative cases and 13(37.1%) of the troponin positive cases. The association between troponin positivity and the presence of STEMI was statistically significant (p<0.0001) (Table 4).

Table 3. Association of ECG findings in Troponin I positive case (n=113)

Indicator	Troponin		Total	P-value *
	Negative (N=78)	Positive (N=35)		
STEMI				<0.0001
No	78 (100.0%)	13 (37.1%)	91 (80.5%)	
Yes	0 (0.0%)	22 (62.9%)	22 (19.5%)	

Fisher Exact Test, Chi-Square Test*

Among 13 patients with non-STEMI, the most common electrocardiographic finding was T-wave inversion, observed in 8 (61.5%) patients. Left bundle branch block (LBB) and sinus rhythm were each noted in 2(15.4%) patients, while ST depression was observed in 1(7.7%) patient (Table 5)

Table 4. Variation of ECG findings in non-STEMI (n=13)

Parameter	Frequency(n=13)	Percent (%)
T WAVE Inversion	8	61.5
LBB	2	15.4
Sinus Rhythm	2	15.4
ST Depression	1	7.7

DISCUSSION

In present study, prevalence of MI was 31%. This prevalence was higher as compared to 13% prevalence in Kafle et al [9]. The difference is likely due to variation in study focus as present study focused on MI while Kafle et al. focused on MINOCA.

Majority of the patient with MI had Nausea/Vomiting (34.3%), followed by sshortness of breath, palpitations, sweating, and dizziness. However, in another study majority of the patient experienced palpitation (42%), followed by shortness of breath (28%), nausea vomiting (25%) and sweating (23%) [10]. These differences are likely due to variation in study population and underlying risk factor distribution between Nepal and India.

In present study, smoking was not associated with MI (p=0.099). However, association between smoking and MI was found in other studies [11, 12]. The difference in findings may be due to variations in sample size, and population characteristics.

Family history of cardiovascular disease had strong association with MI (p=0.004). This finding was consistent with Lind et al which showed that parental history of MI was associated with increased risk of MI [13]. Similar findings are likely because genetic factors increase the likelihood of developing MI among individuals with positive family history [14, 15].

Dyslipidaemia was present in 17.1 % of patients with MI and 11.8 % in patient who presented with other causes of chest pain. But the association was not statistically significant (p=0.448). Similarly, in patient with acute coronary syndrome serum triglyceride level showed a significant positive correlation with troponin I (p=0.023). However, study have shown that patients with chest pain, and positive troponin test with confirmed MI have higher total cholesterol, triglycerides, LDL, and lower HDL highlighting role of lipid abnormalities in MI risk [16]. This may be due to differences in sample, population, and study design.

There was a strong and statistically significant association between troponin status and ECG findings specifically in the presence of STEMI. Similarly, Monica et al. [17] also showed that higher troponin levels are associated with specific MI locations. The similar findings could be because both studies examined patients with ischemic

symptoms and used troponin assays along with correct ECG interpretation. In contrast, no specific ECG changes were observed in NSTEMI patients with positive troponins in study by Khowaja et al. [18]

In a study by Simkhada et al. [19] there were 10.71% non-STEMI cases which is comparable to the present study where 37.1% non-STEMI cases were identified. This similarity suggests a comparable distribution of non-STEMI presentation across both study populations.

Among the 13 patients diagnosed with non STEMI in present study, the most common ECG abnormality was T-wave inversion in 61.5 % indicating myocardial ischemia. Similarly, ST-segment depression was found only in 7.7 %. The ECG variations observed in present study share some similarities with the findings reported in an Indian study depicting that non STEMI commonly presents with subtle ischemic changes rather than classic ST elevation patterns. However, ST segment depression was only 14 % and Deep T wave inversion was diagnosed in 8 % [20]. These variations may be due to extent and location of myocardial injury.

Despite the valuable findings on myocardial infarction among patients presenting with chest pain in a tertiary care setting, this study has some limitations. First of all, the sample size was relatively small from single hospital which limits the generalizability of the findings to other healthcare settings. Second, this study excluded critically ill and trauma patients which could have introduced selection bias as those groups may also be presented with MI. Third, the study depended on single point measurements of troponin and ECG findings without follow up data which may have missed or delayed presentation or myocardial infarction. In addition, potential confounders such as diet, and physical activity were not assessed which may have influenced MI risk and outcomes.

CONCLUSIONS

Myocardial infarction was commonly observed among patients presenting with chest pain in this tertiary setting. Family history of cardiovascular disease and ECG abnormalities particularly ST elevation was strongly associated with MI. These findings highlight the importance of early triage of chest pain cases, with prompt use of clinical

assessment, ECG interpretation, and cardiac biomarkers such as troponin to differentiate the potential life-threatening MI from non-cardiac causes. Pathways of early diagnostic care and rapid management can significantly improve patient outcomes and reduce complications associated with delayed treatment

CONFLICT OF INTEREST

None

SOURCES OF FUNDING

None

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