

**Original Article****Clinical Features, Treatment Choices and in-Hospital Outcome of Patients with ST-Segment Elevation Myocardial Infarction in Eastern Region of Nepal: A Hospital-Based Study****Rajesh Nepal\* and Sahadeb Prasad Dhungana**

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Article Received: 17<sup>th</sup> September, 2019; Accepted: 18<sup>th</sup> December, 2019; Published: 31<sup>st</sup> December, 2019**DOI: <http://dx.doi.org/10.3126/jonmc.v8i2.26754>****Abstract****Background**

Patients with Acute ST-elevation myocardial infarction (STEMI) have different modes of presentation, treatment options and outcomes which vary across the different population. There is a paucity of data about the clinical characteristics of acute STEMI from the eastern part of Nepal. Our study aimed to assess the clinical characteristics and in-hospital outcome of patients with acute STEMI at a tertiary care center of the eastern part of Nepal.

**Materials and Methods**

This is a descriptive cross-sectional study on 214 patients who presented in the emergency room or coronary care unit of Nobel Medical College Teaching Hospital from August 2018 to July 2019. Demographic features, risk factors, duration of symptoms before presentation, different treatment options offered and the in-hospital outcome were noted.

**Results**

The male to female ratio was 2.14. The most common symptom was chest pain (97.0%) followed by sweating 78.0%, breathlessness 29.0%, nausea or vomiting 24.8 %, etc. The most common regional territory involved was the anterior wall (48.1%) followed by the Inferior wall (42.5 %), posterior wall (5.1 %). The majority (71.3%) presented within 12 hours after symptom onset. Hypertension was the most frequent (40.2%) risk factor followed by Smoking (39.7%), diabetes mellitus (35.0%) and dyslipidemia (34.6%). Among patients eligible for primary PCI - 76.6% underwent PCI, 22.0% were managed conservatively. Total mortality among patients managed with primary PCI was 3% as compared to medical therapy (14.8%). Heart failure prevalence was less with primary PCI (12.1%) compared to medical therapy (29.6%)

**Conclusion**

The majority of patients presented with typical symptoms in a reasonably early period (12 hrs) and the in-hospital outcome was better with primary PCI. Hence, efforts should be made to offer primary PCI to the majority of patients in the peripheral part of our country.

**Keywords:** *Myocardial infarction, Nepal, Treatment*

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## Introduction

Myocardial infarction is a common and potentially life-threatening cardiac condition presenting to a hospital emergency. ST-elevation myocardial infarction (STEMI) is caused by acute total occlusion of an epicardial coronary artery, commonly due to atherosclerotic plaque rupture or erosion and subsequent thrombus formation. Acute STEMI is characterized by ischemia and ultimately necrosis of a portion of the entire or nearly the entire thickness of the ventricular wall [1]. Compared to unstable angina (USA) and Non-ST elevation MI (NSTEMI), STEMI is associated with a higher in-hospital and 30-day morbidity and mortality [2].

Prompt percutaneous coronary intervention (PCI) is the preferred approach for STEMI. If timely primary PCI cannot be performed, fibrinolytic therapy is recommended in patients without contraindications [3].

Patients with STEMI have different modes of presentation, treatment options and outcome which vary across the different populations. There is a paucity of data about the clinical characteristics of acute STEMI from the eastern part of Nepal.

## Materials and Methods

This is a descriptive cross-sectional hospital-based observational study of 214 patients who reside in the eastern part of Nepal from August 2018 to July 2019. All the patients who presented in the emergency room or coronary care unit of Nobel Medical College Teaching Hospital underwent a detailed history, physical examination and baseline investigations. Demographic features, cardiovascular risk factors, clinical presentation, Electrocardiogram (ECG) findings were studied and documented. Duration of symptoms before presentation, different treatment options offered and the in-hospital outcome were noted. Inclusion criteria were: Age >18 years, patient fulfilling two out of the three following criteria were included in the study: 1. Prolonged chest discomfort (>20 minutes) 2. ECG changes: New ST segment elevation at the J point in two contiguous leads with the values: 0.1 mV in all leads except V2–V3 where the following values apply:  $\geq 0.2$  mV in men >40 years,  $\geq 0.25$  mV in men <40 years, or  $\geq 0.15$  mV in women. 3. Positive cardiac biomarker (Troponin I). Exclusion criteria were chronic ischemic heart disease and acute coronary syndrome other than STEMI. The in-hospital outcome was defined as the occurrence of re-infarction, stroke, heart failure, and mortality.

The Sample size (n) was calculated by using the formula;  $n = z^2 pq / d^2$ , Where z= standard normal variants for a level of confidence, p=Prevalence

rate,  $q = 1 - p$ , d= Precision. In 382 patients presenting to cath-lab with features of ischemic heart disease from Jan 2011 to Dec 2012 in BPKIHS, Dharan, Nepal, the prevalence of acute STEMI among the patients was 45.33% [4]. So, we have,  $p = 0.45$ ,  $z = 1.96$  for confidence level of 95%,  $d =$  margin of error which is taken as 15% of prevalence. Using the above formula, the minimum sample size for the study for 95% confidence interval was 206. However, all the patients in the study period who fulfilled the inclusion criteria were enrolled into the study. The total number came out to be 214 which were higher than the minimum sample size required.

## Reperfusion therapy

Reperfusion strategy is defined as the therapy provided within 24 hours of symptoms onset (only one of the following were noted for any patient): No reperfusion therapy: when the patient did not receive any primary reperfusion (no Primary PCI and no Fibrinolytic therapy). Fibrinolytic therapy: when the patient received a fibrinolytic agent as a reperfusion strategy. Primary PCI: when the patient underwent coronary angiogram with the intent to conduct primary PCI.

## Statistical analysis

Data were analyzed using Statistical Presentation System Software version 18.0. For the descriptive Study - percentage, mean and standard deviation (SD) was calculated and also the graphical and tabular presentation was made. The comparison was done using the Chi-square test to find out the significant difference between a dependent and independent variables at a 95% confident interval where the level of significance considered at  $P \leq 0.05$ .

## Results

The total number of the study population was 214. The male to female ratio was 2.14. The mean age of the patients was  $59.27 \pm 11.74$  years (range 25 - 93). The mean age for males was  $58.79 \pm 12.16$  year whereas it was  $60.29 \pm 10$  for females. The age and gender distribution have been shown in Table 1. As shown in Figure 1, the most common symptom was chest pain (97%) followed by sweating (78%), breathlessness (29%), nausea or vomiting (24.8%), palpitation (7.5%), and abdominal pain (3.27%). Figure 2 illustrates the regional territory involved. The most common regional territory involved was an anterior wall (48.1%) followed by an inferior wall (42.5%), posterior wall (5.1 %), lateral wall (2.8%) and the anteroinferior wall (1.4%).



As shown in Figure 3, most patients (46.3%) presented within 6 hours from the symptom onset followed by within 6-12 hours (25%) and after 12 hours (25.7%).

As shown in Table 2, there was relatively equal distribution of risk factors with hypertension being the most frequent (40.2%) followed by Smoking (39.7%), Diabetes Mellitus (35%) and Dyslipidemia (34.6%). Table 3 shows the different treatment choices and outcomes of patients with (STEMI). Among all patients who were eligible for primary PCI - 76.6% underwent PCI, 22% were managed conservatively, one patient underwent thrombolysis, two patients underwent thrombolysis followed by PCI. Total mortality among patients managed with primary PCI was 3.0% as compared to patients managed conservatively (14.8%). Heart failure prevalence was less among patients managed with primary PCI (12.1%) compared to patients managed conservatively (29.6%)

**Table 1: Age and gender distribution of ST-segment elevation MI**

	N (%)	Age in years ± SD
Total	214	59.2 ±11.7
Male	146 (68.2%)	58.7± 12.1
Female	68 (31.8%)	60.2 ±10

**Table 2: Prevalence of risk factor among patients with ST segment elevation MI**

Risk Factors	Overall (%)	Male (%)	Female (%)	P value
Hypertension	86 (40.2)	62 (42.4)	24 (35.3)	0.319
Diabetes Mellitus	75 (35.0)	54 (36.9)	21 (30.9)	0.384
Dyslipidemia	74 (34.6)	28 (19.2)	46 (67.6)	0.001
Smoking	85 (39.7)	61 (41.7)	24 (35.3)	0.367
<b>Total</b>	<b>214</b>	<b>146</b>	<b>68</b>	

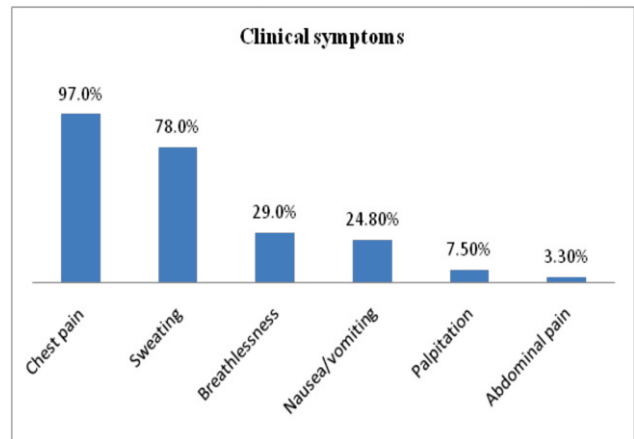
**Table 3: Treatment choices and outcome of patients with ST-segment elevation MI**

	Frequency	Discharge	Mortality	Heart failure	Stroke
Conservative	47 (22.0%)	40 (85.1%)	7(14.8%)	14 (29.6%)	0
PCI	164 (76.6%)	159 (92.6%)	5 (3.0%)	20 (12.1%)	1
Thrombolysis + PCI	2 (0.9%)	2	0	0	0
Thrombolysis	1 (0.5%)	1	0	0	0
<b>Total</b>	<b>214</b>	<b>202 (94.3%)</b>	<b>12 (5.6%)</b>	<b>34 (15.8%)</b>	<b>1</b>

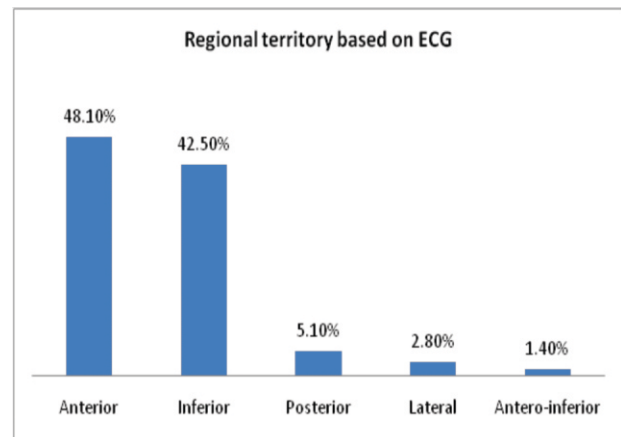
**PCI: Percutaneous coronary intervention**

**Discussion**

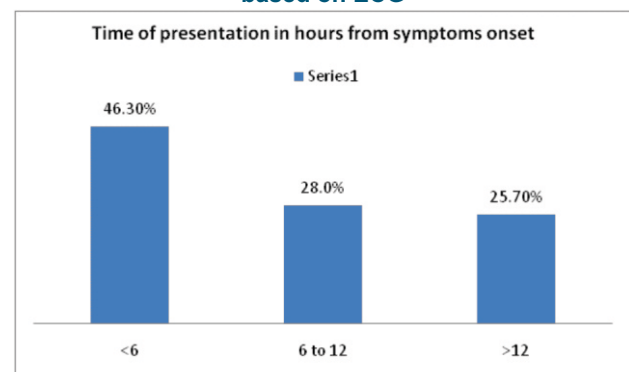
The present study highlights the clinical characteristics, treatment modalities offered, and short-term in-hospital outcome of patients with STEMI in the eastern part of the country. There were dramatic increases in treatment with reperfusion



**Figure 1: Clinical symptoms of patients with ST-elevation MI**



**Figure 2: The regional territory of ST-elevation MI based on ECG**



**Figure 3. Window periods of ST-elevation MI after symptoms onset**

with primary PCI, in the peripheral region where the cardiac catheterization facility has evolved just for a few years. In this study, the mean age of the patient was 59.27±11.74 years which are similar to the findings of studies done in other parts of Nepal [5, 6]. Our population has delayed the onset of MI compared to other south Asians as shown in the INTERHEART study [7] where the median age was 53 (46-61) years. This may be due to variation in dietary habits, occupation, the prevalence of risk factors and industrialization.



Similar to other studies in South Asia [8], the prevalence of acute STEMI in males was greater than in females with male: female ratio being 2.14:1 suggesting that male gender is one of the non-modifiable risk factors for acute STEMI. The common risk factor present in our study was hypertension (40.2%) followed by smoking (39.7%) as seen in the INTERHEART study [7]. In this study, diabetes mellitus (DM) was prevalent in 35.0% of the patients which is closely similar to other studies in Nepal but higher than other South Asian populations [7, 8]. This calls for effective screening and management of DM in our population to minimize the risk of MI. Dyslipidemia (34.6%) was the least common risk factor with low HDL being the most common deranged lipid profile present in 85.1% of patients. It has been shown in the past observational study [9] that every 1 mg/dl increment in HDL was reported to be associated with a 2%-3% decreased the risk of cardiovascular disease in the adult. In our study, the major lipid profile derangement was low HDL (85.1%) which co-relates HDL level as an important risk factor for MI.

#### Clinical symptoms and timing of presentation

The most common presenting symptom was chest pain (97.0%) followed by sweating (78.0%) similar to other studies [10] which indicates that chest pain associated with sweating can be considered as important symptoms in the diagnosis of MI. Most of our patients (46.3%) presented within 6 hours of the onset of symptoms in contrast to the study done in another peripheral center of Nepal [5] where the majority of the patients (48.4%) had presented 48 hours after the symptom onset. Such difference might be due to greater awareness among referring physicians and frequent cardiac camps in different catchment areas in the eastern region of Nepal. The anterior wall was the most commonly involved territory (48.1%) followed by the inferior wall in our study which is closely similar to other studies [5, 11].

#### Treatment choices and in-hospital outcome

Timely primary PCI is the preferred therapy for STEMI [12]. Prompt diagnosis and therapy, mainly with primary PCI, are important in improving not only acute survival but also long-term prognosis. There is an improvement in short- and long-term outcomes in patients with STEMI which are related to the adoption and increased use of established interventional and medical treatments [13, 14]. In our study, the majority (77.5%) underwent primary PCI with a lower prevalence of in-hospital mortality and heart failure. Holay et al [15] revealed that heart

failure (HF) (61.6%) was the most common complication accounting for 61.6%. In contrast, our study showed a lower prevalence of HF (overall 15.8%). Overall in-hospital mortality was 5.6 % with lower prevalence in PCI group (3%) which was similar to the study done in the National Cardiac Center in the capital city of Nepal [16, 17] which showed the in-hospital mortality after MI ranging from 1-6%.

#### Limitations

This is a small size study in a single tertiary care center in the eastern part of Nepal. Only smoking form of tobacco was considered and the duration of conventional risk factors like smoking, hypertension, diabetes, and dyslipidemia was not elaborated which could have a significant impact on the occurrence of acute STEMI.

#### Conclusion

The majority of the patients with acute STEMI were male and the most common risk factors were hypertension and smoking. Chest pain and sweating was the most common presenting symptoms. Most of our patients presented with typical symptoms of chest pain in a reasonably early period (12 hours). Majority underwent primary PCI with lower rate of complications and mortality as compared to conservative treatment. Hence efforts should be made at the national level to offer primary PCI to the majority of patients presenting with acute STEMI.

#### Ethical Clearance

The study was approved by the IERB of Nobel Medical College Teaching Hospital before the beginning of the study.

**Competing interests :** None declared

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