

## Original Research Article

# Clinical profile of patients presenting with acute myocardial infarction

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### ABSTRACT

**Background:** Cardiovascular diseases are the number one cause of death globally. Cardiovascular diseases have emerged as a major health burden in developing countries. Myocardial infarction (MI) is defined by the demonstration of myocardial cell necrosis due to significant and sustained ischaemia. Author attempted to study the risk factors and clinical profile of patients with MI admitted in Cardiology Department of tertiary care center, Chitwan, Nepal.

**Methods:** This descriptive retrospective study was conducted in College of Medical Sciences Teaching Hospital (CMS-TH), Chitwan, Nepal, from January 2016 to November 2017. Demographic features, cardiovascular risk factors, clinical presentation, Electrocardiogram (ECG) findings, regions of infarction and rhythm disturbances were studied and documented.

**Results:** A total of 132 patients diagnosed with MI were studied. Most of the patients (90.15%) had ST-elevation MI (STEMI). The patients were predominantly male (87%). The majority of patients lied in the age group of 61-70 yrs (29.54%). The most common presenting symptom was chest pain (86.36%) followed by shortness of breath (42.42%) and vomiting (12.87%). Tobacco smoking/chewing (62.87%) was the major risk factor followed by hypertension (43.18%) and diabetes (34.09%). Majority of infarction occurred on anterior wall (52.94%). Most of the patients (90.90%) had normal sinus rhythm on ECG. On arrival to emergency department eight (6.06%) patients had cardiogenic shock and only one had congestive cardiac failure.

**Conclusions:** STEMI was most common type of MI presenting to CMS-TH. Most of the patients were male and the most common risk factor contributing to MI was cigarette smoking. Most of the patients arrived more than 24 hours after onset of symptom.

**Keywords:** Clinical profile, Myocardial infarction, ST elevation myocardial infarction, Risk factor

### INTRODUCTION

Cardiovascular diseases are the number one cause of death globally.<sup>1</sup> Majority of the deaths due to cardiovascular diseases are due to coronary heart disease.<sup>1,2</sup> Cardiovascular diseases have emerged as a major health burden in developing countries.<sup>3-5</sup> The South Asian countries of Bangladesh, India, Nepal, Pakistan, Srilanka contribute to the highest proportion of the burden of cardiovascular disease. The early age of onset of

cardiovascular disease in these populations is increasing the disease burden further.<sup>4,6</sup> Deaths due to cardiovascular disease tend to occur 10 or more years earlier in these countries than they do in western countries.<sup>5</sup> Myocardial infarction (MI) is defined by the demonstration of myocardial cell necrosis due to significant and sustained ischaemia. MI is one of the five main manifestations of coronary heart disease, namely stable angina pectoris, unstable angina pectoris, MI, heart failure and sudden death.<sup>7</sup>

The data regarding clinical characteristics of MI is lacking in Nepal. So, we attempted to study the risk factors and clinical profile of patients with myocardial infarction admitted in Cardiology Department of College of Medical Sciences, Teaching Hospital, Chitwan, Nepal. College of Medical Sciences Teaching Hospital (CMS-TH) is a tertiary referral centre located at central part of Nepal which provides Percutaneous Coronary Intervention (PCI) service.

## METHODS

This descriptive retrospective study was conducted in College of Medical Sciences Teaching Hospital, Chitwan, Nepal, from January 2016 to November 2017. The study was conducted after obtaining ethical clearance from institutional review board of CMS-TH. The data was collected from the discharge records of the patients admitted in cardiology department of CMS-TH.

The patients were included if diagnosed with ST-Elevation MI (STEMI) or Non-ST-Elevation MI (NSTEMI) in the discharge sheet. The diagnosis was made according to criteria established by ESC/ACC (European Society of Cardiology/American College of Cardiology ) through evaluation of myocardial necrosis marker in serial determinations (muscle brain fraction of creatine phosphokinase or Troponin I) plus one of the following criteria: ischaemic symptoms, electrocardiographic changes indicative of ischaemia (ST segment elevation or ST depression and T wave changes), development of pathological Q wave on electrocardiogram (ECG) or left bundle branch block, new or presumed new.<sup>8,9</sup> ST segment elevation was defined in the presence of ST segment elevation of  $\geq 1$  mm in two contiguous limb leads or  $\geq 2$  mm in two contiguous chest leads. ST depression and T wave changes were defined as ST depression  $\geq 0.5$  mm in two contiguous leads and T wave inversion  $\geq 1$  mm in two contiguous leads respectively. Pathological Q wave was defined as any Q wave with deflection amplitude of 25% or more of the subsequent R wave or  $>0.04$  second in width. Patients with unstable angina and patients less than eighteen years were not included in the study.

Demographic features (age, gender), cardiovascular risk factors (tobacco smoking/chewing: current or former, hypertension: blood pressure  $\geq 140/90$  mmHg and/or under medication, diabetes: fasting blood glucose  $\geq 126$ mg/dl and/or postprandial blood glucose  $\geq 200$ mg/dl and/or under medication, dyslipidemia: serum high density lipoprotein cholesterol level  $<40$ mg/dl and/or Low Density Lipoprotein cholesterol  $>100$ mg/dl and/or triglycerides  $>150$ mg/dl and/or total cholesterol  $>200$ mg/dl , alcohol consumption), clinical presentation (chest pain, shortness of breath, palpitation, sweating, dizziness, syncope, nausea, vomiting, abdominal pain), Electrocardiogram (ECG) findings (ST segment elevation or depression, Q wave, sinus rhythm, AV block, ventricular tachycardia) and regions of infarction (anterior, inferior or combined) were studied and documented . Statistical analyses were performed by the use of Microsoft Excel.

## RESULTS

A total of 132 patients diagnosed with myocardial infarction were studied regardless of the therapeutic intervention they received. Most of the patients (90.15%) had STEMI. The patients were predominantly male (87%) with male to female ratio being 1.93. Majority of patients (29.54%) were between 61-70 years. The mean age of patients was  $59.98 \pm 12.99$  year.

The most common presenting symptom was chest pain (86.36%), followed by shortness of breath (42.42%), vomiting (12.87%) and sweating (10.60%). Tobacco smoking/chewing (62.87%) was the major risk factor contributing to MI. Tobacco consumption was the leading risk factor in both ST elevation (63.86%) and non-ST segment elevation (53.84%) MI group.

Hypertension (43.18%) was the second most common risk factor followed by diabetes mellitus (34.09%) and dyslipidemia (21.21%). Alcohol consumption was also present in significant percentage of patients (30.30%). The baseline characteristics are shown in (Table 1, 2).

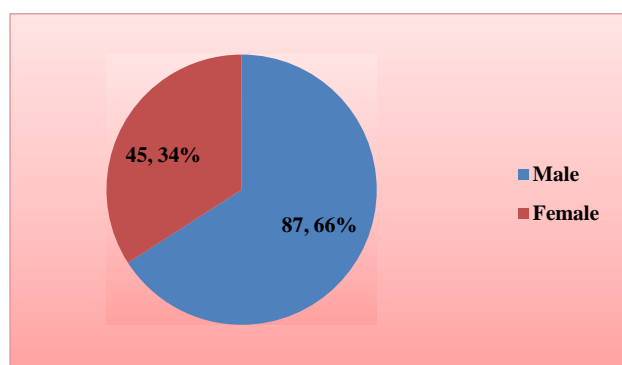
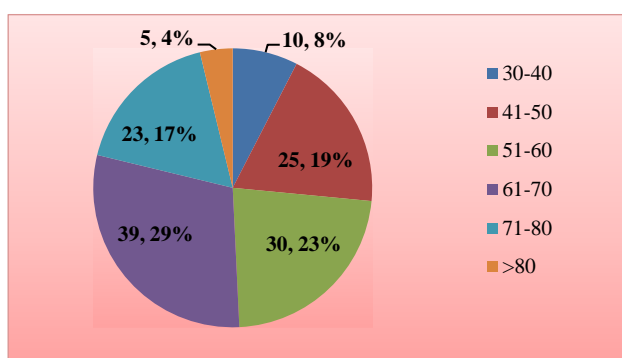
**Table 1: Age wise and gender wise distribution of STEMI and NSTEMI cases.**

Age in years	STEMI (N = 119)		NSTEMI (N = 13)		Overall (N=132)
	Male (%)	Female (%)	Male (%)	Female (%)	
30-40 n (%)	6 (5.04%)	2 (1.68%)	1 (7.69%)	1 (7.69%)	10 (7.57 %)
41-50 n (%)	22 (18.48%)	3 (2.52%)	-	-	25 (18.93 %)
51-60 n (%)	14 (11.76%)	14 (11.76%)	1 (7.69%)	1 (7.69%)	30 (22.72 %)
61-70 n (%)	23 (19.32%)	10 (8.40 %)	2 (15.38 %)	4 (30.76 %)	39 (29.54%)
71-80 n (%)	15 (12.60%)	6 (5.04%)	-	2 (15.38 %)	23 (17.42%)
>80 n (%)	2 (1.68%)	2 (1.68%)	1 (7.69%)	-	5 (3.78 %)

**Table 2: Presenting symptoms and risk factors in STEMI and NSTEMI group.**

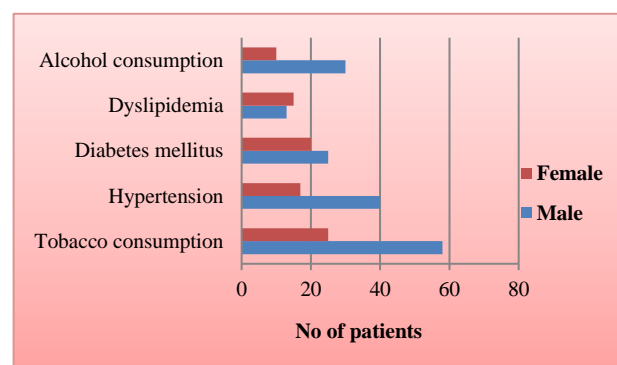
Clinical characteristics	Categories		
Presenting symptom	STEMI (N=119)	NSTEMI (N=13)	Overall (N= 132)
Chest pain n (%)	104 (87.39 %)	10 (88.49 %)	114 (86.36 %)
Shortness of breath n (%)	43 (36.13 %)	13 (100 %)	56 (42.42 %)
Palpitation n (%)	12 (10.08 %)	-	12 (9.09 %)
Sweating n (%)	12 (10.08 %)	2 (15.38 %)	14 (10.60 %)
Dizziness n (%)	10 (8.40 %)	1 (7.69 %)	11 (8.33 %)
Syncope n (%)	3 (2.52 %)	-	3 (2.27 %)
Nausea n (%)	1 (0.80 %)	1 (7.69 %)	2 (1.51 %)
Vomiting n (%)	15 (12.60 %)	2 (15.38 %)	17 (12.87 %)
Abdominal pain n (%)	5 (4.20 %)	3 (23.07 %)	8 (6.06 %)
<b>Risk factors</b>			
Tobacco smoking/chewing n (%)	76 (63.86 %)	7 (53.84 %)	83 (62.87 %)
Hypertension n (%)	51 (42.85 %)	6 (46.15 %)	57 (43.18 %)
Diabetes mellitus n (%)	39 (32.77 %)	6 (46.15 %)	45 (34.09 %)
Dyslipidemia n (%)	24 (20.16 %)	4 (30.76 %)	28 (21.21 %)
Alcohol consumption n (%)	38 (31.90 %)	2 (15.38 %)	40 (30.30 %)

The distribution of overall MI cases as per gender and different age groups is given in the picture below (Figure 1) and (Figure 2) respectively.

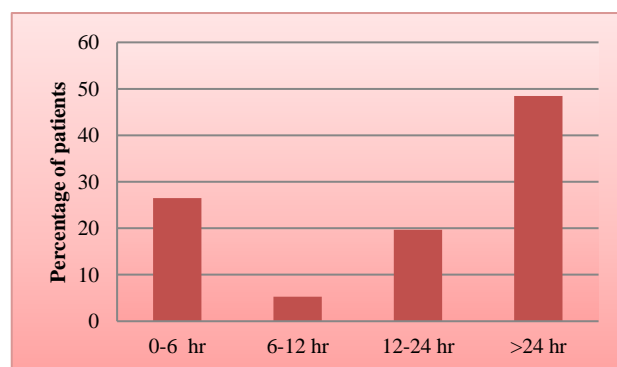
**Figure 1: Gender wise distribution of MI cases.****Figure 2: Age group wise distribution of MI cases.**

The risk factors were present mostly in the male gender except dyslipidemia which was higher in female gender. The number of patients exposed to different risk factors

based on gender is presented in the bar diagram below (Figure 3).

**Figure 3: Gender wise distribution of risk factors.**

Most of the patients (48.48%) presented to our emergency department more than twenty-four hours after onset of symptom. Only 31.81 % patients presented within twelve hours after onset of symptom as shown in bar diagram below (Figure 4).

**Figure 4: Time of arrival to ER after symptom onset.**

Majority of patients (90.15%) on arrival to emergency department in our centre had ST segment elevation. Majority of infarction (52.94%) occurred on anterior wall and 41.17% occurred on inferior wall. Most of the patients (90.90%) had normal sinus rhythm on ECG. AV block was seen in six (4.54%) patients. The ECG findings on arrival to emergency department are shown in (Table 3).

Table 3: ECG findings at arrival to Emergency department.

ECG Characteristics (N =132)	Categories, n (%)
ST segment elevation MI	119 (90.15 %)
Non- ST segment elevation MI	13 (9.84 %)
Pathological Q wave	9 (6.81 %)
Site of infarction (N = 119)	
Anterior wall	63 (52.94 %)
Inferior wall	49 (41.17 %)
Anterior + inferior wall	2 (1.68 %)
Anterior + lateral wall	3 (2.52 %)
Inferior + lateral wall	2 (1.68 %)
Other characteristics (N = 132)	
Normal sinus rhythm	120 (90.90%)
Sinus tachycardia	4 (3.03 %)
Sinus bradycardia	1 (0.75 %)
Ventricular tachycardia	1 (0.75 %)
AV Block	6 (4.54 %)

On arrival to emergency department eight (6.06%) patients had cardiogenic shock and only one had congestive cardiac failure.

## DISCUSSION

Cardiovascular disease is a global public health problem contributing to thirty percent of global mortality and ten percent of the global disease burden. The burden of cardiovascular disease is greater in low- and middle-income countries as compared to high income countries because of much larger population size and widespread exposure to increasing levels of risk factors such as unhealthy diet, physical inactivity, obesity, tobacco use, diabetes, raised blood pressure and abnormal blood lipids.<sup>4,5,7</sup>

In the present study, the mean age of the patients with MI was 59.98±12.99 yr which is similar to 58.9±11.8 years in a large South Asian study.<sup>6</sup> However, the mean age for overall South Asian patients was 53±11.4 years in the South Asian study. The rate of MI was higher in males than females (66% versus 34%) which is consistent with findings in previous studies.<sup>10-12</sup> Present study demonstrated that with increasing age the number of females with MI also increased (2.27% at 41 to 50 years to 11.36% at 51 to 60 years). This may be due to loss of protective effect of estrogen in post-menopausal women. The vasodilatory action of estrogen may be responsible for this protective effect.<sup>13</sup> The rate of ST segment elevation MI was higher than non-ST segment elevation MI in our

study which was also the finding in a prospective analysis of registry data in India.<sup>14</sup>

However, in one of the large study in Middle East, majority of patients had NSTEMI.<sup>12</sup> There is a relative increase in incidence of NSTEMI as compared to STEMI in western countries as described in epidemiological study of coronary heart disease and acute coronary syndrome.<sup>15</sup> This shows that STEMI still constitutes the major type of myocardial infarction in our setting. The clinical presentation in our study showed chest pain as the predominant symptom (86.36%). Atypical symptoms like abdominal pain, dizziness, syncope was observed in higher age group as shown in a comparative study of acute MI in elderly and non-elderly in India.<sup>16</sup>

Cigarette smoking was the leading risk factor and mostly seen in male patients which was also the finding in the INTERHEART study.<sup>17</sup> The risk factor was present mostly in ST segment elevation MI (63.86 %) similar to that in a large cross-sectional western study.<sup>18</sup> Cigarette smoking was a leading risk factor for MI in South Asian studies as well.<sup>10,11</sup> It is a well-known fact that cigarette smoking is associated with an increased incidence of acute MI. Cigarette smoking is thought to cause initiation and/or propagation of thrombus formation by disrupting homeostasis secondary to increased oxidative stress as explained in an update of the pathophysiology of cigarette smoking and cardiovascular disease.<sup>19</sup> Diabetes mellitus alone was a risk factor in 45 (34.09%) patients in our study. There was a highly significant association between diabetes and MI among Asians in a study among Asians and Europeans in United Kingdom.<sup>20</sup> There is increased risk of cardiovascular disease in diabetic patients as documented in the Framingham study.<sup>21</sup> Accelerated atherosclerotic plaque formation and intraluminal thrombosis in diabetics is thought to increase the incidence of MI as well as mortality post-MI which is well explained in an article from the institute for the prevention of cardiovascular disease, Harvard.<sup>22</sup>

Hypertension was the second most common risk factor in our study. Hypertension was significantly associated with MI in different studies in South Asia.<sup>6,10,11,17</sup> Diabetes and hypertension were common in male gender in our study while it was more common in female gender in the INTERHEART study.<sup>17</sup> Dyslipidemia was also present in significant extent in our study with female gender being exposed more than males while it was more common in male gender in one study in eastern Nepal.<sup>23</sup> Anterior wall was the most common site of infarction similar to that in a study in India<sup>10</sup> while inferior wall was the predominant site of infarction in other study in Pakistan.<sup>11</sup> Patients with anterior wall MI have worse prognosis with increased incidence of complications and deaths than inferior wall MI.<sup>24,25</sup> Although the follow up data were not available, the higher incidence of anterior wall MI may contribute to increasing mortality burden from MI in our setting.



Small sample size and the data collected from single tertiary care centre constitute the limitations of the present study.

## CONCLUSION

From this retrospective study, we can draw some valuable points regarding clinical profile of patients with MI. STEMI was the most common type of MI presenting to CMS-TH. Most of the patients were male and the most common risk factor contributing to MI was cigarette smoking. Chest pain was the most common presenting symptom. Anterior wall was the most common site involved. Most of the patients arrived more than 24 hrs after onset of symptom. This demands the need of expansion of PCI service across different parts of Nepal. Also, different primary and secondary preventive strategies should be encouraged at local and national levels to reduce the burden of MI.

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