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A Prospective Observational Study on the Clinical Profile Assessment of Myocardial Infarction Patients in a Tertiary Care Teaching Hospital

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Background: Cardiovascular Diseases (CVDs) are the single largest contributor to the global burden of disease and are recognized as the leading cause of death globally. CHD has various clinical manifestations ranging from asymptomatic to acute conditions, namely acute coronary syndrome. Cardiovascular risk factors for acute coronary syndrome (ACS) are on the rise in people

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of Indian origin. Myocardial Infarction (MI) also called as heart attack, infarction means the death of an area of tissue because of interrupted blood supply. Myocardial Infarction has become a growing concern among the cardiovascular diseases, hence the study is conducted in order to assess the clinical profile of patients suffering from MI.

Aim: To assess the clinical presentations, risk factors, short-term complications and management of patients with MI.

Methodology: A prospective observational study was conducted in a tertiary care teaching hospital over six months. A total of 121 patients were selected based on inclusion and exclusion criteria.

Results: Among the 121 patients included, the predominant were males (63.63%). Most of the patients fell under the age group of 51-60 (n=46). The common presenting symptoms were chest pain (42.32%), followed by breathlessness (26.04%) and sweating (15.34%). Most patients had NSTEMI (62.80%) and STEMI (37.19%). Alcohol (23.44%) was major risk factor followed by smoking (22.48%) and diabetes (14.35%). The elevated biomarkers noted were Troponin I (42.14%), Troponin T (37.19%) and CK-MB (6.61%) respectively. The majority of infarctions occurred on inferior wall (30.57%). The most prevalent complication observed was heart failure (14.8%) followed by sinus tachycardia (6.61%), and sinus bradycardia (5.78%). The majority of patients received key medications like anti-platelet agents, statins and anti-coagulants during hospital stay.

Conclusion: The risk of men developing myocardial infarction is more compared to women due to various reasons. It is more likely that the diagnosis of myocardial infarction is neglected due to certain presenting symptoms like epigastric pain, syncope, vomiting, sweating etc., hence this study was conducted with an overview of creating awareness regarding the severity of myocardial infarction along with the advantages of early diagnosis.

Keywords: MI; CHD; STEMI; NSTEMI.

1. INTRODUCTION

Cardiovascular diseases (CVDs) are the single largest contributor to the global burden of disease and are recognized as the leading cause of death globally [1]. Among which ischemic heart disease (IHD), characterized by insufficient blood flow to the muscle tissue of the heart, is the world's biggest killer, responsible for 16% of global deaths in 2019 according to the world health organization (WHO) [2]. CHD has various clinical manifestations ranging from asymptomatic to acute conditions, namely acute coronary syndrome (ACS) [3]. Cardiovascular risk factors for acute coronary syndrome (ACS) are on the rise in people of Indian origin [4].

Acute coronary syndromes (ACSs) is a term that includes all clinical syndromes compatible with acute myocardial ischemia resulting from an imbalance between myocardial oxygen demand and supply. ACSs are classified according to electrocardiographic (ECG) changes into:

- ST-segment elevation ACS (STEMI)
- Non-ST-segment elevation ACS (NSTEMI)
- Unstable Angina (UA) [5]

When patients with prolonged ischemic discomfort at rest are first seen, the working clinical diagnosis is that they are suffering from an acute coronary syndrome (ACS) [6].

MYOCARDIAL INFARCTION Commonly called as heart attack, infarction means the death of an area of tissue because of interrupted blood supply. Because the heart tissue distal to the obstruction dies and is replaced by noncontractile scar tissue, the heart loses some of its strength [7].

STEMI	***NSTEMI***
STEMI is a medical emergency caused byacute total occlusion of an epicardial coronary artery, most often due to atherosclerotic plaque rupture/erosion andsubsequent thrombus formation [8]	NSTEMI is defined by an elevation of cardiac enzymes (creatine kinase MB (CK-MB) or troponin) and the absence of ST- segment elevation. Of NSTEMI patients, 25% develops Q wave Mis [8]

Patients with myocardial infarction present with two types of symptoms:

- *Typical symptoms* – usually include chest, arm, or jaw pain described as dull, heavy, tight or crushing [9].
- *Atypical symptoms* – include giddiness, dyspnoea, vomiting, sweating, and epigastric pain in the absence of chest pain [10].

- The median number of PCI procedures per million people in the 2023 survey was lower in middle-income compared with high-income countries (1355 vs 2330) but the number of primary PCI procedures was greater in middle-income countries (6248.8 vs 477.8), probably reflecting a greater burden of ST-elevation myocardial infarction.
- Recently, however, data in cohorts aged <40 years have shown that modestly abnormal lipid values are associated with higher risk of myocardial infarction over a median follow-up of 5.2 years [11].
- In 2020, approximately 19.1 million deaths were attributed to CVD globally. The age-adjusted death rate per 100,000 population was 239.8. The age-adjusted prevalence rate was 7354.1 per 1000,000 [12].
- The death rate of heart disease is estimated at approximately 31% globally, according to the World Health Organization (WHO) and over 23.6 million people worldwide may die from CHD [13].
- Statistics suggest that among overall cardiovascular deaths, 0.9 million (68.4%) is caused by IHDs and is increasing to a greater number in the years to come [14].
- Meanwhile, fatalities from stroke and **heart attack (MI)** have reached 17.7 million in the world from heart disease [13].
- Global burden of disease studies have shown that cardiovascular diseases, and in particular CHD, are the greatest cause of morbidity and mortality in most of the world, including both wealthy as well as poorer countries [15].

2. MATERIALS AND METHODS

This prospective observational study was carried out in the Department of General Medicine, Vijayanagara Institute of Medical Sciences (VIMS), Ballari, Karnataka over a period of six months (March 2023 to September 2023). Approval from Institutional Ethical Committee was taken before the commencement of the study.

Study Sample Size: Sample size was calculated by using the formula

$$n = Z^2pq/d^2$$
$$n = (1.96)^2 \times 0.92 \times 0.08/(0.05)^2$$
$$n = 113$$

n=Required sample size
p=Estimated proportion

Z= Reliability co-efficient
d=Margin of error

The minimum required sample size was 113 MI patients. 121 was the achieved sample size.

2.1 Study Population

Patients aged above 18 years with a diagnosis of Myocardial Infarction during the period of the study.

2.2 Inclusion Criteria

Patients aged above 18 years admitted with a diagnosis of Myocardial Infarction. Patients who were diagnosed with both STEMI, NSTEMI and other co morbid conditions were included in the study.

2.3 Exclusion Criteria

- Patients below 18 years
- Patients who are not willing to sign informed consent form.

2.4 Materials Used

Data collection form, Informed consent form, Patient information leaflet.

3. RESULTS

A total number of 121 subjects were covered during the study. Out of which 77 (63.63%) were male and 44 (36.36%) were female. The maximum number of patients were among the age group of 51-60 (n=46).

Among 121 patients, the majority of males had a habit of smoking (n=47) and alcohol consumption.

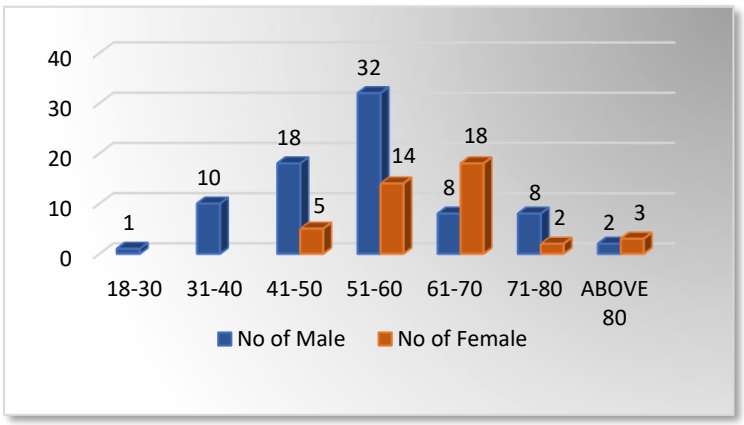

Fig. 1. Age group wise distribution of patients

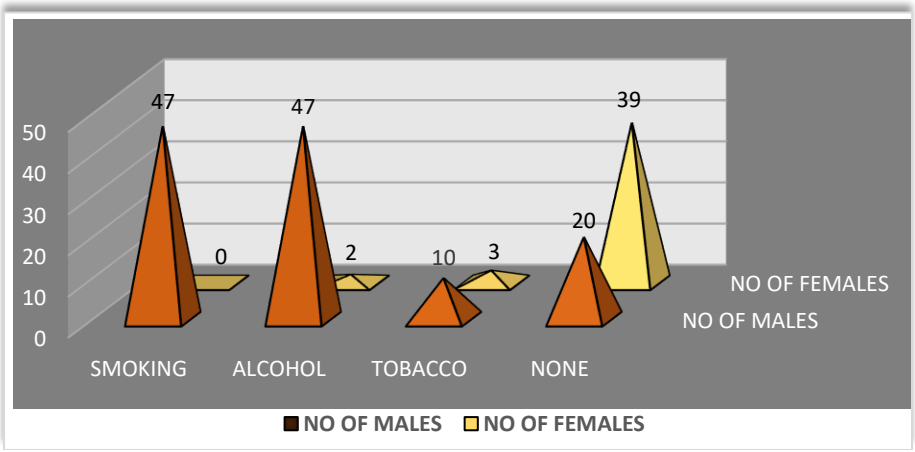

Fig. 2. Distribution of patients according to social habits

Table 1. Presenting symptoms

Presenting symptoms	No of cases	Percentage
Chest pain	91	42.32%
Breathlessness	56	26.04%
Sweating	33	15.34%
Vomiting	9	4.18%
Abdominal pain	8	3.72%
Giddiness	7	3.25%
Epigastric pain	4	1.86%
Syncope	3	1.39%
Vertigo	2	0.93%
Palpitations	2	0.93%
Total	**215**	**100%**

(n=47), followed by tobacco chewing (n=10). Whereas, some females had a habit of tobacco chewing (n=3) and alcohol consumption (n=2).

The common presenting symptoms were chest pain (42.32%), followed by breathlessness (26.04%) and sweating (15.34%).

Among 121 patients, 45 (37.19%) had STEMI, and 76 (62.80%) NSTEMI.

The elevated biomarkers among the study subjects were like, 51 (42.14%) patients had elevated Troponin I, 45 (37.19%) patients had elevated Troponin T and 8 (6.61%) with elevated CK-MB.

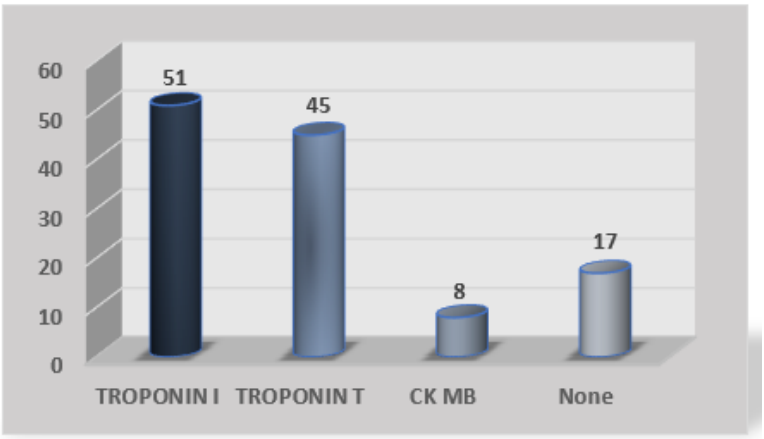

Fig. 3. Elevated Biomarkers

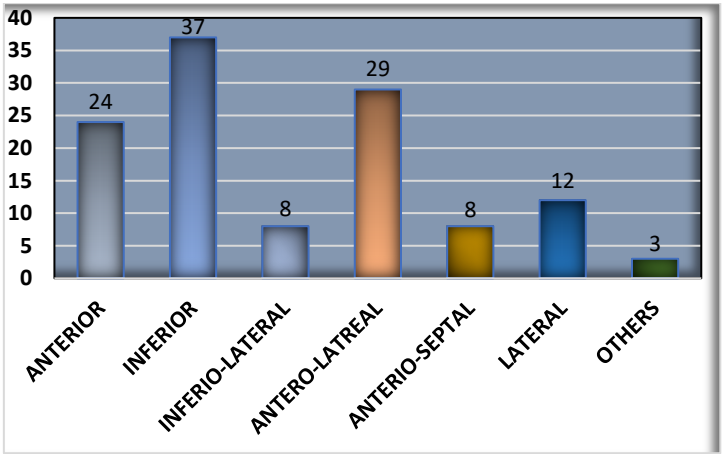

Fig. 4. Site of Infarction

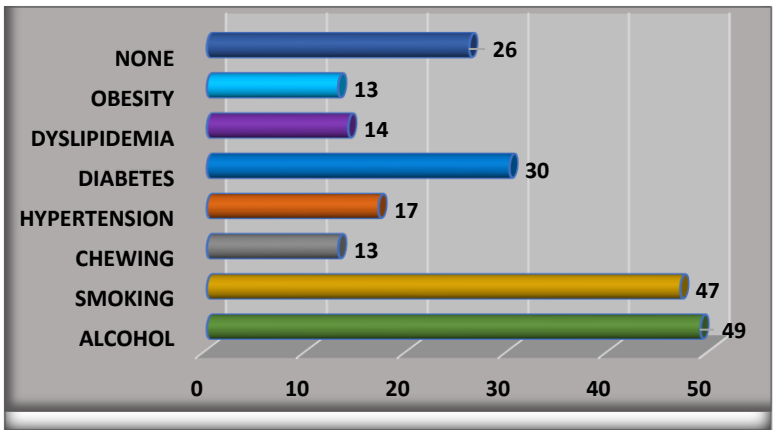

Fig. 5. Risk factors

The most common site of infarction was the inferior wall, affected in 37 (30.57%) patients, 29 (23.96%) patients with anterio-lateral, 24 (19.83%) anterior, 12 (9.91%) lateral, 8 (6.61%) anterio-septal, and 3 (2.47%) others.

The changes in ECG have been recorded as follows: ST elevations were in 38 (31.40%) patients, ST depressions in 35 (28.92%), T-wave inversions in 30 (24.79%), pathological Q wave in 9 (7.43%), LBBB in 7 (5.78%) and 2 others (1.65%).

Among 121 patients, 49 (23.44%) were alcoholics, 47 (22.48%) smokers, 13 (6.22%) were tobacco chewers, 17 (8.13%) hypertensive patients, 30 (14.35%) diabetic patients, 14 (6.69%) patients with dyslipidemia, 13 (6.22%) patients with obesity and 26 (12.44%) did not have any risk factors.

Comorbidities are divided based on the system. 5 (4.13%) patients had central nervous system comorbidities, 3 (2.47%) endocrine system comorbidities, 16 (13.22%) respiratory system comorbidities, 6 (4.95%) renal system comorbidities, and 6 (4.95%) other comorbidities and 85 (70.24%) patients without comorbidities.

Complications of myocardial infarction observed among the study subjects were, 18 patients with heart failure (14.8%), 8 patients with sinus tachycardia (6.61%), 7 patients with sinus bradycardia (5.78%), 7 patients with cardiogenic shock (5.78%), 2 patients with dilated cardiomyopathy (1.65%), 2 patients with atrial fibrillation (1.65%), 1 patient with atrial flutter (0.82%), and 76 (62.80%) patients had no complications.

Table 2. Comorbidities

Comorbidities	No of cases	Percentage
Central nervous system	5	4.13%
Endocrine system	3	2.47%
Respiratory system	16	13.22%
Renal system	6	4.95%
Others	6	4.95%
None	85	70.24%

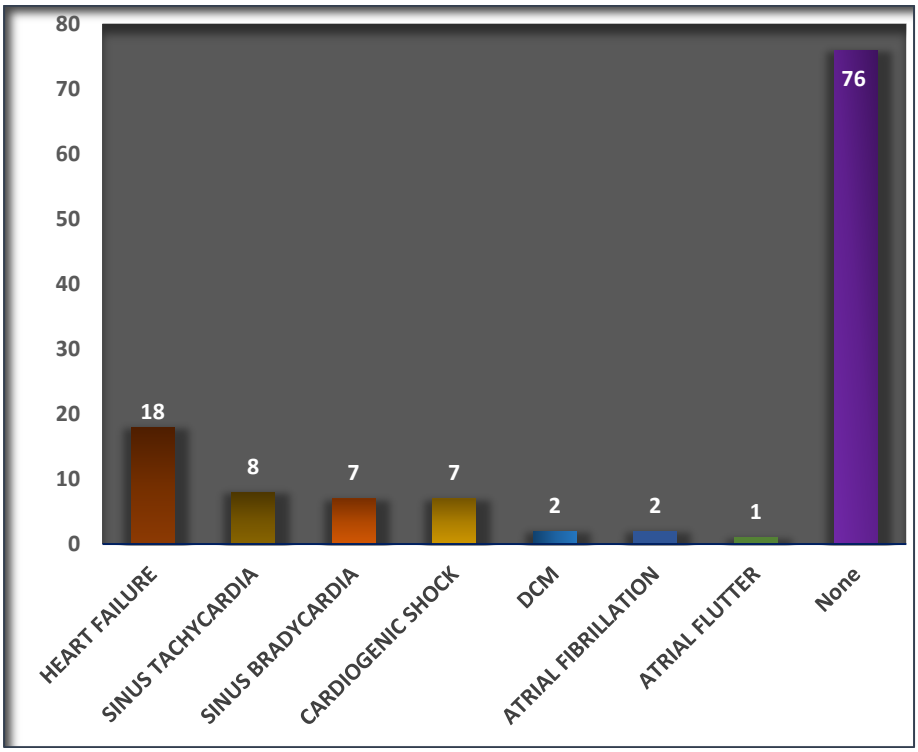

Fig. 6. Complications

Commonly prescribed agents – 121 (21.88%) patients received Aspirin, 115 (20.79%) Clopidogrel, 120 (21.69%) Atorvastatin, 93 (16.81%) Heparin, 46 (8.31%) Metoprolol, 32 (5.78%) Nitrates, 23 (4.15%) Streptokinase, 2 (0.36%) with ticagrelor and 1 (0.18%) with fondaparinux.

Table 3. Commonly prescribed agents during hospital stay

Name of drugs	No of patients	Percentage
Aspirin	121	21.88%
Clopidogrel	115	20.79%
Atorvastatin	120	21.69%
Heparin	93	16.81%
Streptokinase	23	4.15%
Metoprolol	46	8.31%
Nitrates	32	5.78%
Ticagrelor	2	0.36%
Fondaparinux	1	0.18%
Total	**553**	**100%**

4. DISCUSSION

A total of 121 patients were included in the study, among the study population males 77 (63.63%) predominate over females 44 (36.36%) which was similar to Niveditha Alok Swamy et al, [16] & most of the patients fall under the age group of 51-60 (n=46) which was nearly identical to Sapkal Harish Barsu et al,[17] study.

Chest pain (42.32%) followed by breathlessness (26.04%) and sweating (15.34%) were the common symptoms observed in patients. These findings were similar to Bhagwan Das Negi et al,[18] study.

Among the study population, the most common ECG interpretation was found as ST-elevation (31.40%) ST-depression (28.92%) T wave Inversion (24.79%) and others which were homogeneous with the study conducted by Sadeq Tabatabai et al [19].

In the current study, the most infarctions occurred in inferior wall (30.57%) followed by anterio-lateral (23.96%), anterior (19.83%) and others. These findings were incompatible with the Bhagwan Das Negi et. al. [18] study.

Among the study population, our results on the type of MI are as follows NSTEMI (62.80%), and STEMI (37.19%) which is in contrast with Sadeq Tabatabai et al., [19] study. Our conclusion on biomarkers, Troponin I (42.14%), followed by Troponin T (37.19%) and CK-MB (6.61%) were distinctive from the Anand Premanand et. al, [20] study.

Among the study population, the common complications were found as HF (14.8%) followed by sinus tachycardia (6.61%), sinus bradycardia (5.78%) and others. These findings are in liaison with the studies conducted by Sadeq Tabatabai et al [19] and Govind Adhikari et al [21] respectively.

Contrary to the Niveditha Alok Swamy et al [16] study, the major risk factor observed in our study was alcohol, followed by smoking & diabetes.

5. CONCLUSION

The risk of men developing myocardial infarction is more compared to women due to various reasons. It is more likely that the diagnosis of myocardial infarction is neglected due to certain presenting symptoms like epigastric pain, syncope, vomiting, sweating etc., hence this study was conducted with an overview of creating awareness regarding the severity of myocardial infarction along with the advantages of early diagnosis.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

CONSENT

All the authors have declared that written informed consent form was obtained from all the patients.

ETHICAL APPROVAL

All the authors hereby declare that the study was conducted by the approval of the institutional ethics committee. (Reg.No – TVMCP/IEC/V PD/2022-2023/03)

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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