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Demographic and Clinical Profile of Patients with Acute ST-Elevation Myocardial Infarction

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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: Myocardial Infarction (MI) stands as a significant contributor to global morbidity and mortality. characterized by the irreversible death (necrosis) of heart muscle due to prolonged oxygen deprivation (ischemia), MI poses a substantial health threat. In the United States alone, around 1.5 million cases of MI are reported annually.

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Aim of the Study: To assess the demographic and clinical profile of patients with acute ST-elevation myocardial infarction.

Methods: This cross-sectional descriptive study was conducted at the Department of Cardiology BSMMU, Dhaka, Bangladesh from Jun 2013 to Dec 2013. The study included a purposive sample of 100 cases diagnosed with acute ST-elevation myocardial infarction as study participants. Data collection utilized a semi-structured predesigned questionnaire, and analysis was conducted using MS Office tools and SPSS Version 23.0.

Results: The mean ± SD age of participants was 52.84 ± 8.40 years, with 77% being male. Clinical symptoms included chest pain in 97% and breathlessness in 90% of cases. In clinical findings, the mean ± SD heart rate was 88 ± 15, systolic blood pressure was 136.75 ± 19.25, diastolic pressure was 85.30 ± 11.52, and BMI was 25.76 ± 2.51 Kg/m2. Risk factors for STEMI comprised hypertension in 61%, smoking in 52%, dyslipidemia in 100%, diabetes mellitus in 46%, and a family history of IHD in 43% of patients. Left ventricular ejection fraction was 50.82 ± 9.99%, and random blood sugar was 222.82 ± 72.16 mg/dl.

Conclusion: Aged males are predominantly susceptible to acute ST-elevation myocardial infarction (STEMI), with chest pain and breathlessness being the most prevalent clinical symptoms. Common risk factors for STEMI include hypertension, smoking, dyslipidemia, diabetes mellitus, and a family history of ischemic heart disease (IHD).

Keywords: Demographic profile; ST-elevation myocardial infarction; STEMI; chest pain.

1. INTRODUCTION

Coronary artery disease stands as the leading cause of morbidity and mortality in Western society, representing a global epidemic. In 2001, ischemic heart disease accounted for 11.8% of all deaths (5.7 million) in low-income countries and 17.3% (1.36 million) of all deaths in high-income countries. The incidence of acute myocardial infarction (AMI) has seen a decline from 244 per 100,000 populations in 1975 to 184 per 100,000 populations in 1995, and in-hospital mortality rates have dropped from 18% in 1975 to 12% in 1995. Despite these improvements, AMI remains a significant public health concern, with an estimated 14.2 years of life lost due to an AMI [1]. In the United States, approximately 1.3 million patients are admitted to hospitals each year with UA/NSTEMI, while around 300,000 patients are admitted with acute STEMI. The incidence of UA/NSTEMI compared to STEMI seems to be increasing. Almost half of the patients with UA/NSTEMI are women, while over three-quarters of the patients with STEMI are men [2]. Although reperfusion therapy has contributed to reducing mortality, most patients with acute MI are not eligible for this treatment and face in-hospital death rates ranging from 10% to 20% [3]. In India, cardiovascular disease is the leading cause of death. The death rate due to CVD in India was 32% of all deaths in 2007 and is expected to rise from 1.17 million in 1990 and 1.59 million in 2000 to 2.03 million in 2010 [4]. The incidence of acute myocardial infarction (AMI) in Bangladesh has been shown to increase from 3.3 per thousand to 14 per thousand between the years 1975 and 1985 [5]. Previously, AMI was classified as transmural or non-transmural based on the presence or absence of Q waves on the electrocardiogram (ECG). However, autopsies have revealed that not all patients diagnosed with transmural infarction and large Q waves on the ECG had necrosis throughout the entire thickness of the myocardium. Conversely, some patients without Q waves on the ECG have been found to have necrosis throughout the entire thickness of the myocardium. Therefore, the terms Q wave and non-Q wave infarction are used to describe myocardial infarctions without specificity [6]. The World Health Organization (WHO) has historically defined acute myocardial infarction (AMI) based on three criteria: typical ischemic chest pain, typical ECG pattern including the development of Q waves, and a rise and fall in serum markers of myocardial injury. If a patient did not have evidence of acute ST elevation or Q waves but showed evidence of myonecrosis, they would be diagnosed with non-ST elevation myocardial infarction (NSTEMI) [7]. However, more recently, an international consensus document was published by a joint task force consisting of the European Society of Cardiology, the American College of Cardiology the American Heart Association and the World Heart Federation [8]. The objective of this current study was to assess the demographic and clinical profile of patients with acute ST-elevation myocardial infarction.

2. METHODOLOGY

This was a descriptive cross-sectional study conducted at the Department of Cardiology in Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh. A total of 100 patients admitted with Acute ST-elevation Myocardial Infarction (MI) were included in the study, based on the presence of typical chest pain, Electrocardiogram (ECG) evidence of persistently elevated ST segments in two or more contiguous leads, and raised cardiac markers. The study received approval from the hospital's ethical committee, and all participants provided written consent before data collection. Patients with non-ST elevation MI, previous MI, preexisting valvular heart disease, and those who did not provide consent were excluded from the study. Demographic and clinical information of the participants was recorded and analyzed using MS Excel and SPSS version 23.0.

3. RESULTS

The study involved 100 participants, with 46% aged 50 years or younger, 35% between 51 and 60 years, and 19% between 61 and 70 years. The mean age of the participants was 52.84 years, with a standard deviation of 8.40. The gender distribution of the study participants showed that 77% were male and 23% were female. This resulted in a male-to-female ratio of 3.34:1. The distribution of clinical symptoms among the patients revealed that 97% of the cases presented with chest pain, while breathlessness was reported in 90% of the patients. The clinical findings among the study participants revealed mean values for various parameters. The average heart rate was found to be 88 beats per minute, with a standard deviation of 15. Systolic blood pressure measured an average of 136.75 mmHg, with a standard deviation of 19.25. Diastolic blood pressure averaged at 85.30 mmHg, with a standard deviation of 11.52. Lastly, the participants had an average BMI (Body Mass Index) of 25.76 Kg/m^2, with a standard deviation of 2.51. The study revealed that the distribution of risk factors in the population sample showed a high prevalence of dyslipidemia at 100%. Hypertension and smoking followed with a prevalence rate of 61% and 52% respectively. Diabetes mellitus and a family history of IHD were evident in 46% and 43% of the participants respectively. The average Left Ventricular Ejection Fraction (LVEF) was found to be 50.82%, with a standard deviation of 9.99. Additionally, the study participants had an average Random Blood Sugar (RBS) level of 222.82 mg/dl, with a standard deviation of 72.16.

Table 1. Age distribution of study participants (N=100)

Age (Years)	n	%
≤ 50 yrs.,	46	46%
51-60 yrs.,	35	35%
61-70 yrs.,	19	19%
Mean ± SD	52.84 ± 8.40	

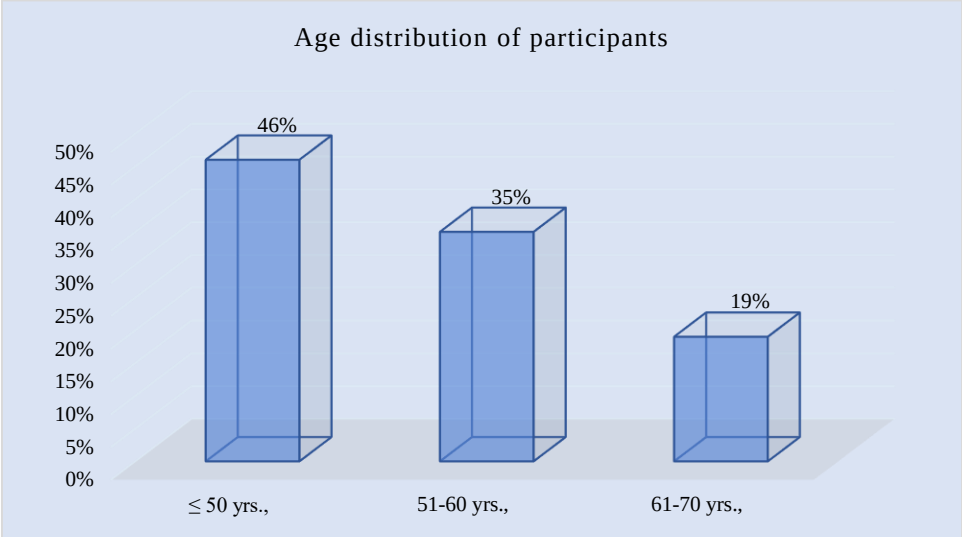

Fig. 1. Column chart showed age wise participants distribution (N=100)

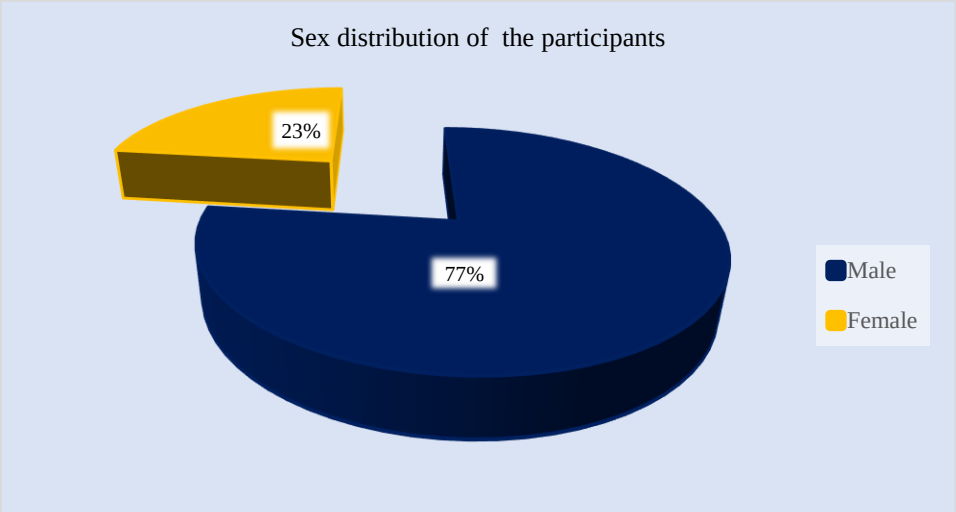

Fig. 2. Pie chart showed gender wise participants distribution (N=100)

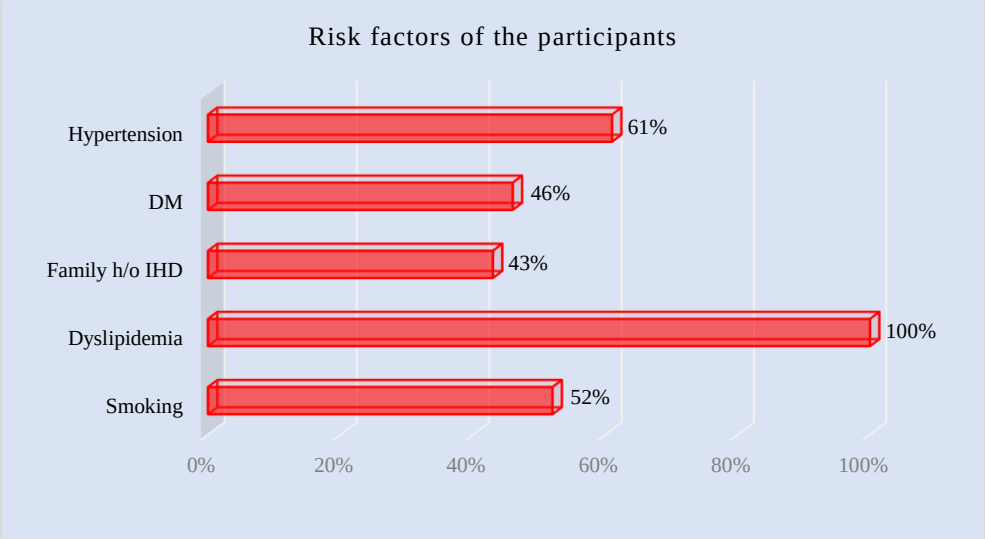

Fig. 3. Bar chart showed risk factors wise participants (N=100)

Table 2. Distribution of clinical symptoms (N=100)

Clinical symptoms	n	%
Chest Pain	97	97%
Breathlessness	90	90%
Cardiac Arrest	0	0%

Table 3. Distribution of clinical findings (N=100)

Clinical findings	Mean ± SD
Heart Rate (per minute)	88 ± 15
Systolic BP (mmHg)	136.75 ± 19.25
Diastolic BP (mmHg)	85.30 ± 11.52
BMI (Kg/m^2)	25.76 ± 2.51

Table 4. Distribution of risk factors (N=100)

Risk Factors	n	%
Smoking	52	52%
Dyslipidemia	100	100%
Family h/o IHD	43	43%
DM	46	46%
Hypertension	61	61%

Table 5. Distribution of investigation findings (N=100)

Investigations	Mean ± SD
LVEF (%)	50.82 ± 9.99
RBS (mg/dl)	222.82 ± 72.16

4. DISCUSSION

This study aimed to assess the demographic and clinical profile of patients with acute ST-elevation myocardial infarction. The study found that the mean age of the patients was 52.84 ± 8.4 years (Table 1). In the acute STEMI group, the highest proportion of patients (46%) were in the age group of less than 50 years. This finding was consistent with a study conducted by Hossain SM [9], which reported the highest number of patients (40%) in the 51 to 60 years' age group with acute STEMI. In our study, female patients constituted only a small portion of the study population, while male patients accounted for 77% of the acute STEMI cases. This finding aligned with the observations of Pitta et al. [10] who found 61.4% of male patients in acute STEMI and Thanavaro et al. [11] who found 70%. Therefore, our study findings supported the notion that a higher number of male patients were more prone to developing acute STEMI. The study investigated the presence of risk factors prior to the onset of myocardial infarction. Among these risk factors, smoking was found to be the most common (52%), and individuals who smoked were more susceptible to developing acute STEMI. Similar findings were reported by Laji et al. [12], who observed a prevalence of 54.8%, and Culic et al. [13], who found it to be the most common risk factor in their study with a prevalence of 47.8%. In this study, all patients had dyslipidemia, whereas Cox et al. [14] reported dyslipidemia in 37% of patients with acute STEMI. It is worth noting that dyslipidemia was more prevalent in our study compared to the aforementioned studies. Additionally, hypertension was present in 61% of patients in our study, while Culic et al. [13] and Madias et al. [15] found rates of 32.4% and 28%, respectively, in hypertensive patients with acute STEMI. In this study, diabetes mellitus was found in 46% of patients, which is consistent with the findings of Hanania et al. [16]. Similarly, Berger et al. [17] reported a prevalence of diabetes mellitus in 21% and 23% of patients, respectively. The mean admission pulse rate, systolic blood pressure, and diastolic blood pressure were found to be higher in our study. This finding is in line with the observations by Brilakis et al. [18] in acute STEMI. The mean ejection fraction was 50.82 ± 9.99. Patients with a low left ventricular ejection fraction (LVEF) are more prone to developing complications. Hanania et al. [16] reported a similar pattern of results in acute STEMI.

5. CONCLUSION AND RECOMMENDATION

The study highlights that older males are predominantly vulnerable to acute ST-elevation myocardial infarction (STEMI), with chest pain and breathlessness emerging as the most prevalent clinical symptoms. Key risk factors contributing to acute STEMI include hypertension, smoking, dyslipidemia, diabetes mellitus, and a family history of ischemic heart disease (IHD). These findings underscore the importance of targeted interventions and preventive measures to address the specific risk profile of this demographic in mitigating the incidence of acute STEMI.

6. LIMITATION OF THE STUDY

The study had limitations, with a small sample size, being a single-center study, and lacking long-term follow-up. These constraints might restrict findings' generalizability, limit data diversity due to the single-center approach, and prevent a comprehensive understanding of sustained effects. It is crucial to interpret the study's outcomes cautiously, taking these limitations into account when applying the findings to broader contexts.

CONSENT AND ETHICAL APPROVAL

The study received approval from the hospital's ethical committee, and all participants provided written consent before data collection. Patients with non-ST elevation MI, previous MI, preexisting valvular heart disease, and those who did not provide consent were excluded from the study

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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