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RESEARCH ARTICLE

Risk Factor Distribution and Complication Patterns in St-Elevation Myocardial Infarction: A Prospective Study

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Abstract

Background: ST-elevation myocardial infarction (STEMI) is a major cause of cardiovascular morbidity and mortality worldwide. Understanding the clinical profile and complications of STEMI patients is crucial for improving management and outcomes.

Objective: To evaluate the clinical characteristics, risk factors, and complications among patients with STEMI.

Methods: This observational study included 120 patients admitted with STEMI. Clinical data including age, sex, and risk factors (hypertension, diabetes mellitus, dyslipidemia, smoking, family history of CAD) were recorded. Complications were assessed during hospitalization.

Results: Of 120 patients, 80 (66.7%) were male and 40 (33.3%) were female, with a mean age of 56.65 ± 12.5 years. The most prevalent risk factor was hypertension (60%), followed by diabetes mellitus (45%), smoking (40%), dyslipidemia (35%), and positive family history (15%). Common complications included heart failure (30%), arrhythmias (25%), cardiogenic shock (10%), and mechanical complications (5%).

Conclusion: STEMI predominantly affects middle-aged males and is strongly associated with modifiable risk factors such as hypertension, diabetes, and smoking. Early recognition and aggressive management of complications can improve outcomes.

Keywords: ST-Elevation Myocardial Infarction, Clinical Profile; Risk Factors, Hypertension, Diabetes Mellitus, Smoking, In-Hospital Complications, Heart Failure, Arrhythmias, Cardiogenic Shock, Mechanical Complications.

1. Introduction

Cardiovascular diseases (CVDs) remain the leading cause of mortality worldwide, accounting for an estimated 17.9 million deaths annually [1]. Among the spectrum of acute coronary syndromes (ACS), ST-elevation myocardial infarction (STEMI) represents the most severe and life-threatening manifestation, characterized by complete occlusion of a coronary artery resulting in transmural myocardial ischemia [2]. Despite significant advances in diagnosis, reperfusion strategies, and pharmacotherapy, STEMI continues to be a major contributor to morbidity and mortality, particularly in low- and middle-income countries where access to timely interventions may be limited [3]. The pathophysiology of STEMI is primarily attributed to rupture or erosion of an atherosclerotic plaque with subsequent thrombus formation leading

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to acute coronary artery occlusion [4]. Several modifiable and non-modifiable risk factors have been implicated in the development of coronary artery disease (CAD) and STEMI, including hypertension, diabetes mellitus, dyslipidemia, smoking, and family history of premature CAD [5,6]. Identification of these risk factors is crucial for implementing effective preventive strategies and reducing the overall burden of disease. Clinical presentation of STEMI typically includes chest pain, dyspnea, diaphoresis, and may be accompanied by hemodynamic instability or arrhythmias [7]. Early recognition and reperfusion therapy, whether by primary percutaneous coronary intervention (PCI) or thrombolysis, are key to reducing infarct size and improving survival [8]. Nevertheless, complications such as heart failure, cardiogenic shock, life-threatening arrhythmias, and mechanical complications still occur and are associated with worse outcomes [9]. Epidemiological data on STEMI varies between populations, with differences observed in age distribution, gender predominance, risk factor prevalence, and complication rates [10]. Understanding these variations in the local context is essential for optimizing resource allocation and improving patient outcomes. The present study was undertaken to assess the clinical profile, distribution of major cardiovascular risk factors, and in-hospital complications among patients admitted with STEMI. This information may help guide targeted interventions aimed at reducing the impact of modifiable risk factors and improving prognosis in this high-risk patient population.

2. Methods & Materials

This prospective observational study was conducted on 120 consecutive patients diagnosed with ST-elevation myocardial infarction (STEMI) who were admitted to the Cardiology dept. at 250 Bed General Hospital, Kushtia, Bangladesh during the study period from January to December 2024. The study was approved by the institutional ethics committee, and informed consent was obtained from all participants.

2.1 Inclusion and Exclusion Criteria: All patients aged ≥18 years presenting with clinical features suggestive of acute myocardial infarction and diagnostic ST-segment elevation on electrocardiogram (ECG) were included. STEMI was defined according to the Fourth Universal Definition of Myocardial Infarction, requiring new ST-segment elevation in at least two contiguous leads (≥1 mm in limb leads or ≥2 mm in precordial leads) or new left bundle branch block with elevated cardiac biomarkers. Patients with non-ST-elevation myocardial infarction (NSTEMI), unstable angina, myocarditis, pericarditis, or those who refused consent were excluded.

2.2 Data Collection: Demographic data including age, sex, and detailed clinical history were obtained at admission. Risk factors such as hypertension, diabetes mellitus, dyslipidemia, smoking status, and family history of premature coronary artery disease (CAD) were documented based on patient history, previous medical records, and laboratory investigations. A complete clinical examination was performed, and vital parameters were recorded. Laboratory tests including cardiac biomarkers, lipid profile, renal function tests, and blood glucose levels were measured as per standard hospital protocol.

2.3 Diagnosis and Monitoring: All patients underwent 12-lead ECG at presentation and were monitored in the coronary care unit (CCU). Echocardiography was performed where necessary to assess left ventricular function and detect mechanical complications. Patients were treated according to standard STEMI management guidelines, including reperfusion therapy when indicated.

2.4 Outcome Measures: Patients were observed throughout their hospital stay for development of complications such as heart failure, arrhythmias, cardiogenic shock, reinfarction, and mechanical complications (ventricular septal rupture, free wall rupture, papillary muscle rupture).

2.5 Statistical Analysis: Data were entered into Microsoft Excel and analyzed using SPSS software version 25. Continuous variables were expressed as mean ± standard deviation (SD), and categorical variables were presented as frequencies and percentages.

3. Results

A total of 120 patients with ST-elevation myocardial infarction (STEMI) were included in this study. The mean age of the study population was 56.65 ± 12.5 years, ranging from 30 to 85 years. Among them, 80 patients (66.7%) were male and 40 (33.3%) were female, demonstrating a male-to-female ratio of 2:1 (Figure 1).

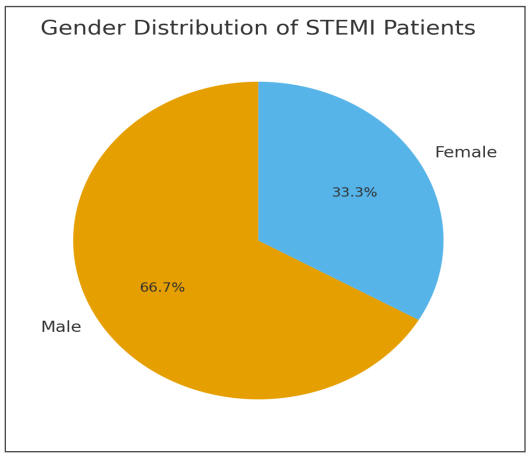

Figure 1. *Gender Distribution of STEMI Patients*

3.1 Risk Factor Profile: Hypertension was the most prevalent risk factor, present in 60% of patients, followed by diabetes mellitus in 45%, smoking in 40%, and dyslipidemia in 35%. A positive family history of coronary artery disease (CAD) was identified in 15% of patients. The distribution of risk factors is presented in Table 1 and visually depicted in Figure 2, where hypertension and diabetes together accounted for the majority of cases.

Table 1. *Distribution of Risk Factors among STEMI Patients (N = 120)*

Risk Factor	Number of Patients (n)	Percentage (%)
Hypertension	72	60.0
Diabetes Mellitus	54	45.0
Dyslipidemia	42	35.0
Smoking	48	40.0
Family History of CAD	18	15.0

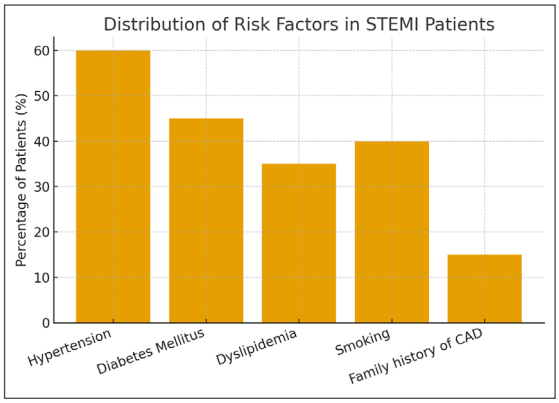

Figure 2. *Distribution of Risk Factors in STEMI Patients*

3.2 Clinical Complications: During hospitalization, 30% of patients developed heart failure, making it the most common complication. Arrhythmias were observed in 25% of patients, including ventricular tachycardia and atrial fibrillation. Cardiogenic shock occurred in 10% of patients, while mechanical complications such as ventricular septal rupture, free wall rupture, and papillary muscle rupture were reported in 5% of cases. The overall complication profile is summarized in Table 2.

Table 2. *In-Hospital Complications among STEMI Patients (N = 120)*

Complication	Number of Patients (n)	Percentage (%)
Heart Failure	36	30.0
Arrhythmias	30	25.0
Cardiogenic Shock	12	10.0
Mechanical Complications	6	5.0

3.3 Summary of Findings: These results indicate that STEMI predominantly affects middle-aged men with multiple co-existing cardiovascular risk factors, particularly hypertension and diabetes mellitus. Heart failure and arrhythmias remain the leading in-hospital complications, contributing significantly to morbidity and mortality.

4. Discussion

In this observational study of 120 STEMI patients, we found that the majority were middle-aged males with a mean age of 56.65 ± 12.5 years and a male-to-female ratio of 2:1. This male predominance is consistent with several previous studies, which have reported higher incidence rates of STEMI among men, likely due to differences in hormonal protection, risk factor exposure, and health-seeking behavior [11,12]. Hypertension emerged as the most common risk factor in our study, followed by diabetes mellitus, smoking, and dyslipidemia. These findings are in agreement with the INTERHEART study, which identified hypertension and diabetes as major contributors to acute myocardial infarction globally [13]. The relatively high prevalence of smoking (40%) in our cohort highlights the continued importance of tobacco cessation programs as a key preventive measure [14]. Family history of CAD was present in 15% of patients, reflecting a genetic predisposition, as observed in earlier studies [15]. Complication rates in our study were notable, with heart failure affecting 30% of patients, making it the most common in-hospital event. Similar rates have been reported in other regional studies, emphasizing that left ventricular systolic dysfunction remains a major cause of morbidity after STEMI [16]. Arrhythmias were documented in 25% of cases, including ventricular tachyarrhythmias and atrial fibrillation, which are known predictors of adverse outcomes [17]. Cardiogenic shock occurred in 10% of patients, which aligns with the reported incidence of 5–15% in literature [18]. Mechanical complications, though rare (5%), remain catastrophic events associated with high mortality despite advances in surgical management [19]. The relatively high prevalence of complications in our study may reflect delays in reperfusion therapy, limited availability of primary PCI facilities, and late presentation — a common issue in resource-limited settings [20]. These findings highlight the urgent need for strengthening pre-hospital care systems, ensuring early recognition of STEMI, and expanding access to reperfusion strategies. Our study has several strengths, including prospective data collection and comprehensive assessment of risk factors and complications. However, certain limitations should be acknowledged. This was a single-center study with a relatively small sample size, which may limit the generalizability of results. Additionally, we did not evaluate long-term outcomes post-discharge, which could provide further insight into prognosis.

5. Conclusion

In conclusion, our findings confirm that STEMI in this population predominantly affects middle-aged males with high prevalence of hypertension and diabetes, and is frequently complicated by heart failure and arrhythmias. These results underscore the need for aggressive risk factor modification, early diagnosis, and prompt reperfusion therapy to reduce the burden of STEMI-related morbidity and mortality.

Conflict of Interest: None.

Source of Fund: Nil.

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