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Influence of Common Risk Factors on In-Hospital Outcomes in Patients Over 40 Years with Acute STEMI

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Abstract **Original Research Article**

Background: ST-elevation myocardial infarction [STEMI] is a critical manifestation of coronary artery disease, posing substantial health risks, particularly among individuals over 40 years of age. In this population, cumulative exposure to risk factors such as hypertension, diabetes mellitus, dyslipidemia, and smoking, alongside age-related physiological changes, significantly contributes to increased morbidity and mortality. This study investigates the relationship between prevalent cardiovascular risk factors and in-hospital outcomes among older patients with acute STEMI. ***Methods:*** A hospital-based observational study was conducted in the Department of Medicine at Khulna Medical College Hospital, Bangladesh, from June to November 2016. Fifty patients aged above 40 years diagnosed with acute STEMI were enrolled using purposive sampling. Data on demographics, clinical features, and echocardiographic parameters were collected using structured questionnaires. Statistical analyses were performed using SPSS version 27.0, employing the Chi-square test with a significance threshold of $p<0.05$. ***Results:*** Among the 50 participants, 80% were male and 20% female. Hypertension [80%] and smoking [54%] were the most common risk factors, followed by diabetes mellitus [46%], dyslipidemia [36%], and a family history of ischemic heart disease [32%]. Major complications included heart failure [32%], arrhythmias [8%], cardiogenic shock [18%], post-MI angina [12%], and in-hospital mortality [14%]. Patients with multiple risk factors exhibited significantly poorer outcomes. ***Conclusion:*** The clustering of cardiovascular risk factors was strongly correlated with adverse in-hospital outcomes and higher mortality rates among older STEMI patients. Hypertension and smoking emerged as predominant contributors, emphasizing the need for early detection and comprehensive risk management strategies.

Keywords: Acute coronary syndrome [ACS], Risk factors, STEMI, In-hospital outcome.

INTRODUCTION

ST-elevation myocardial infarction [STEMI] is a critical cardiac emergency and remains one of the foremost causes of global morbidity and mortality despite remarkable progress in diagnostic and therapeutic modalities [1]. The clinical burden is particularly substantial among individuals aged 40 years and older, who frequently exhibit less favorable prognoses compared to younger cohorts. While younger patients often present with limited comorbidities and reduced vascular damage, older adults tend to experience more extensive myocardial injury, severe complications, and higher fatality rates [2].

Both modifiable and non-modifiable cardiovascular risk factors play significant roles in the development and progression of STEMI. Key modifiable risks—such as hypertension, diabetes mellitus, dyslipidemia, obesity, and smoking—are major contributors to coronary atherosclerosis and subsequent myocardial infarction [3,4]. Prolonged exposure to these factors, compounded by age-related vascular degeneration, intensifies myocardial damage and impairs recovery. For instance, hypertension has been strongly associated with left ventricular dysfunction and unstable angina, whereas elevated low-density lipoprotein [LDL] cholesterol independently increases infarction risk

irrespective of demographic or socioeconomic conditions [5]. Likewise, cigarette smoking is consistently linked to poor in-hospital outcomes and increased early mortality among patients with STEMI [6,7].

In low- and middle-income countries such as Bangladesh, the adverse effects of these risk factors are often exacerbated by delayed hospital presentation, limited availability of advanced reperfusion techniques, and inadequate secondary prevention initiatives. Consequently, evaluating the prevalence and prognostic impact of these risk determinants among older STEMI patients is vital for optimizing evidence-based clinical care and improving survival outcomes.

The present study, conducted at Khulna Medical College Hospital, aimed to examine the distribution of predominant cardiovascular risk factors and their association with key in-hospital outcomes—such as mortality, cardiac complications, and intensive care requirements. By analyzing patient demographics, comorbid conditions, echocardiographic parameters, and clinical progression, this research sought to identify predictors of unfavorable outcomes and propose strategies for enhancing patient management in comparable healthcare settings.

MATERIALS AND METHODS:

Beginning in June 2016 and continuing through November 2016, observational research was carried out at the Department of Medicine at Khulna Medical College Hospital, which is located in Khulna, Bangladesh. Patients over the age of 40 who were diagnosed with acute ST-elevation myocardial infarction [STEMI] were the subjects of this hospital-based study, which aimed to analyze the clinical features and outcomes of patients while they were in the hospital. For the purpose of this study, a total of fifty patients were recruited. Patients showing acute STEMI and having one or more predisposing risk factors were eligible to participate in the study under the terms of eligibility. A family predisposition to coronary artery disease or a previous myocardial infarction were among the risk variables. Other risk factors were diabetes, hypertension, dyslipidemia, tobacco use, obesity, and risk factors for coronary artery disease. Patients who had been diagnosed with valvular heart disease, congenital heart disease, cardiomyopathy, severe renal impairment, cancer, or any other substantial systemic illnesses were not allowed to participate in the research. A major component of the research design was the acquisition of informed permission from all patients or their legal guardians prior to any data collection. This consent was obtained before any data was collected. Following the rigorous documentation of each participant's health history, a comprehensive physical examination was performed, with a particular emphasis placed on the evaluation of the evaluation of the cardiovascular system. In order to confirm the presence of acute ST-elevation myocardial infarction [STEMI], diagnostic procedures such as electrocardiograms [ECGs], serum cardiac enzyme exams, and fasting lipid profiles were utilized. The procedure of collecting data was standardized via the use of structured case record forms, and the selection of participants was carried out through the use of non-randomized purposive sampling in order to successfully accomplish the objectives of the study. During the course of the patients' hospitalization, the primary clinical outcomes that were evaluated included the beginning of heart failure, arrhythmias, mechanical problems, re-infarction, cardiogenic shock, and mortality that occurred within the hospital. A comprehensive analysis was performed on the data that was acquired by making use of the software known as the Statistical Package for the Social Sciences [SPSS]. For the purpose of determining the statistical significance of the results, the Chi-square test was employed, with a significance threshold set at $p < 0.05$.

Throughout the entirety of the research project, ethical concerns were rigorously preserved in accordance with the ethical norms that were established in the Declaration of Helsinki. Because of this dedication, it was ensured that the participants were provided with comprehensive information regarding the objectives, techniques, and procedures of the study. In addition, they were made aware of their right to resign from the research at any moment, which was communicated to them directly. Informed written permission was obtained from each and every participant, or, if relevant, from their legally authorized representatives. This was done to guarantee that ethical standards were adhered to and that patient autonomy was respected.

Statistical analysis: All data were analyzed using SPSS software [version 27.0].

RESULTS:

The study effort comprised fifty individuals diagnosed with ST-segment elevation myocardial infarction [STEMI] who met the predetermined inclusion and exclusion criteria. All participants were admitted to the Medicine ward of Khulna Medical College Hospital. To ensure consistency and thorough recording for each patient, the lead investigator conducted the data collection using a standardized questionnaire. The Chi-square test was employed for data analysis, with statistical significance defined at $p < 0.05$.

Upon concluding the demographic analysis of the participants, it was shown that males constituted 80% of the study's overall population while other 20% were female. [Table 1].

Table-1: Distribution of the study population according to sex [n=50]

Sex	Number	Percentage
Male	40	80%
Female	10	20%

Table 1 showed sex distributions of the study population. In this study 80% male patients had ST elevated MI and 20% female had ST elevated MI.

In case of Occupation of the study group, 80% of the study population was adhered to sedentary lifestyle while the rest 20% were in occupations involving physical activities.

Table-2: Distribution of the study population according to occupational [n=50]

Occupation	Number	Percentage
Sedentary	40	80%
Active	20	20%

Table 2 showed work distributions of the study population. In this study 80% patients were sedentary worker and 20% patients were active worker.

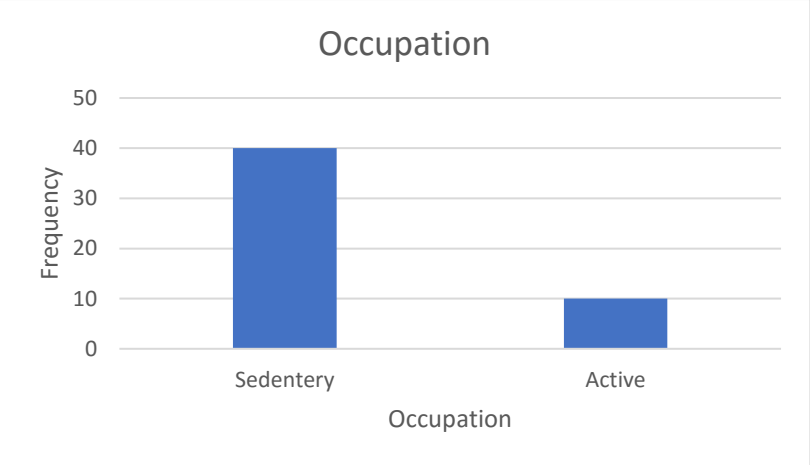

Figure 1: Distribution of the study population according to occupational [n=50]

The results of the risk factor assessment, which are presented in Table 3, illustrated that a significant proportion of patients were smokers [54%], had a history of ischemic heart disease in their families [32%], and exhibited dyslipidemia [36%]. Participants also tended to have higher body mass index [BMI] levels. On the other hand, conditions such as hypertension [80%], diabetes [46%], and a previous history of angina [28%] were found to have considerably higher incidences, particularly when age was taken into consideration.

Table-3: Distribution of study population according to risk factors [n=50].

Risk factors	>40 Years
Hypertension	40 [80%]
Diabetes mellitus	23 [46%]
Dyslipidemia	18[36%]
Obesity • Normal • Obese • Overweight	 30[60%] 08[16%] 12[24%]
Previous history of Angina or acute MI	14[28%]
Family early history of IHD	16[32%]
Smoking	27[54%]
History of taking alcohol	04[8%]

Table-3 showed the study population had a significantly higher proportion of smoking [54%], family history of IHD [32%], dyslipidemia [36%], and higher BMI. But hypertension [80%], diabetes [46%] and history of angina [28%] were significantly higher.

According to the findings of the clinical outcome analysis, a relatively high percentage of the patients experienced extremely serious complications. To be more specific, 32% of the patients developed heart failure, 8% of them experienced arrhythmias, and 18% of them experienced cardiogenic shock. According to the data presented in Table 4, the mortality rate within the hospital was 14%, while the incidence of post-myocardial infarction [post-MI] angina was reported to be 12%.

Table-4: Distribution of study population according to in-hospital outcome [n-50].

In-Hospital outcome	>40 Years
Heart failure Class I Class II Class III Class IV	16[32%] 00[00%] 03[06%] 04[08%] 9[18%]
Post MI angina	06 [12%]
Re-infarction	03[06%]
Significant Arrhythmia • Ventricular tachycardia/Ventricular fibrillation • Atrial fibrillation • Complete heart block	 04[08%] 03[06%] 05[10%]
Cardiogenic shock	09[18%]
Mechanical complications [MR]	02[04%]
Death	07[14%]

Table 4 showed the in-hospital outcome of the study participants. In this study the patients had developed heart failure [32%], arrhythmia [8%], cardiogenic shock [18%], post MI angina [14%] and death [12%].

DISCUSSION:

This observational analysis examined the association between prevalent cardiovascular risk factors and short-term in-hospital outcomes among patients aged over 40 years diagnosed with ST-elevation myocardial infarction [STEMI] at Khulna Medical College Hospital. The study revealed a predominance of male patients [80%], consistent with previous findings from Bangladesh, where male preponderance in STEMI cases is frequently observed [8]. The higher incidence in men may be attributed to hormonal differences, greater exposure to behavioral and occupational stressors, and the higher prevalence of smoking among males due to cultural and social acceptance [9].

A substantial proportion of participants [80%] reported sedentary lifestyles, reflecting the ongoing shift in occupational dynamics characterized by mechanized work and diminished physical activity in both rural and urban environments. Comparable trends have been described in regional studies, where approximately 80–85% of myocardial infarction patients engage in sedentary occupations [10]. Physical inactivity is widely recognized as a significant risk factor for ischemic heart disease and may contribute to the increasing burden of STEMI in Bangladesh [11].

The frequency of conventional cardiovascular risk factors—hypertension [80%], smoking [54%], diabetes mellitus [46%], dyslipidemia [36%], and a family history of ischemic heart disease [32%]—illustrates a clustering of metabolic and behavioral determinants contributing to coronary pathology. These results mirror findings from prior regional investigations, although minor variations in prevalence may be explained by differences in socioeconomic status, diet, and healthcare access across populations [12].

Post-infarction complications were common and often severe, including heart failure [32%], arrhythmias [8%], cardiogenic shock [18%], post-myocardial infarction angina [12%], and in-hospital mortality [14%]. These figures underscore the gravity of STEMI and are in agreement with studies from South Asia reporting mortality rates between 8% and 22% [13–15]. The coexistence of multiple risk factors was strongly associated with unfavorable outcomes, emphasizing the necessity of integrated management that prioritizes early detection, lifestyle changes, and rigorous control of comorbidities.

Overall, the findings of this study underscore the urgent need for comprehensive preventive measures aimed at modifiable risk factors. Interventions such as smoking cessation programs, promotion of regular physical activity, lipid regulation, and improved management of hypertension and diabetes could significantly reduce cardiovascular morbidity and mortality. Strengthening public awareness and ensuring rapid hospital access remain critical to improving outcomes for older STEMI patients in resource-

constrained healthcare systems. Furthermore, community and hospital-based strategies addressing sedentary behavior, smoking, and dyslipidemia are essential. Continued research into lifestyle determinants and their relationship with cardiovascular health in Bangladesh will aid in formulating targeted, evidence-based prevention frameworks.

CONCLUSION:

In patients aged >40 years, the presence of several risk variables was significantly linked to elevated mortality and negative in-hospital outcomes. The principal risk factor is smoking, and the primary medical condition is hypertension.

Abbreviation:
IHD: Ischemic Heart Disease
ICU: Intensive Care Unit
MI: Myocardial Infarction
STEMI: ST-Elevation Myocardial Infarction

Conflict of Interest: No

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