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Original Research Article

Common Risk Factors and Their Association with In-Hospital Outcomes in Acute ST-Segment Elevation Myocardial Infarction Patients Over 40 Years

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Abstract: ***Background*:** ST-elevation myocardial infarction (STEMI) is a leading cause of cardiovascular mortality, particularly in low- and middle-income countries where timely reperfusion strategies are often limited. Understanding the prevalence of cardiovascular risk factors and their association with adverse in-hospital outcomes is critical for improving patient care in resource-constrained settings. This study aims to evaluate the prevalence of common cardiovascular risk factors and describe their relationship with in-hospital outcomes among patients aged over 40 years presenting with acute STEMI at a tertiary hospital in Bangladesh. ***Methods:*** A prospective observational study was conducted at the Department of Medicine, Khulna Medical College Hospital, from June to November 2016. Fifty consecutive patients aged >40 years with confirmed acute STEMI were enrolled. Demographic data, cardiovascular risk factors, and in-hospital complications were recorded using a structured case record form. Descriptive statistics were used to summarize findings. ***Results:*** Of the 50 patients, 80% were male and 80% had sedentary occupations. The most prevalent risk factors were hypertension (80%), smoking (54%), diabetes mellitus (46%), dyslipidemia (36%), and a family history of ischemic heart disease (32%). Overweight and obesity were observed in 24% and 16% of patients, respectively. Common in-hospital complications included heart failure (32%), arrhythmias (24%), cardiogenic shock (18%), post-myocardial infarction angina (12%), and death (14%). ***Conclusion:*** STEMI in this cohort predominantly affected males and was associated with a high burden of modifiable risk factors, particularly smoking, sedentary lifestyle, hypertension, and diabetes.

Keywords: ST-Elevation Myocardial Infarction, Cardiovascular Risk Factors, In-Hospital Outcomes, Bangladesh, Acute Coronary Syndrome.

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Introduction

ST-elevation myocardial infarction (STEMI) remains one of the most lethal forms of acute coronary syndrome, characterized by complete coronary artery occlusion and associated with high short-term mortality rates—ranging from 2.5% to 10% within 30 days, escalating if complications arise before treatment, underscoring the critical need for prompt intervention.[1] In low- and middle-income countries like Bangladesh, where timely revascularization strategies such as PCI may remain limited, in-hospital mortality continues to be notably elevated.[2, 3] Understanding and addressing risk factors associated

with adverse in-hospital outcomes is essential to improve survival in vulnerable groups.

Cardiovascular risk factors such as hypertension, diabetes, smoking, dyslipidemia, obesity, and sedentary lifestyle are well-established contributors to STEMI incidence and severity worldwide.[4, 5] In Bangladesh, non-communicable diseases account for approximately 61% of the national disease burden, with nearly all adults exhibiting at least one risk factor, and more than a quarter carrying multiple risk factors.[6, 7] The Framingham and Seven Countries studies long ago established the foundational link between modifiable risk factors—especially hypertension and hypercholesterolemia—and coronary events, yet context-specific data from Bangladeshi populations remain scarce.[8, 9]

While global observations reveal that the profile and impact of risk factors may vary with age, with older patients generally exhibiting higher rates of comorbidities and adverse outcomes—most research has focused on elderly cohorts above 65 or 80 years.[10-12] There remains a significant gap in the literature concerning patients aged just over 40 years, a group in which STEMI remains prevalent but whose risk-outcome dynamics may differ from both younger and elderly populations. In settings like Bangladesh, where lifestyle shifts (e.g., increased sedentary behavior) and rising prevalence of hypertension and metabolic disorders are observed, understanding specific risk profiles in this age group is particularly pressing.[13]

This study therefore aims to fill that knowledge gap by examining the prevalence of common cardiovascular risk factors and their associations with in-hospital outcomes—including mortality, heart failure, arrhythmias, and cardiogenic shock—in patients aged over 40 years presenting with acute STEMI at a tertiary hospital in Bangladesh. By focusing on this demographic, our findings could help inform targeted clinical strategies and resource allocation to enhance acute care responsiveness and reduce adverse outcomes in similar low-resource settings.

Methods

Study Design and Setting

This was a hospital-based, prospective observational study conducted at Department of Medicine at Khulna Medical College Hospital, a tertiary care center in Khulna, Bangladesh, over a period of *June to* November 2016. The hospital serves as a referral center for acute coronary syndrome cases from surrounding districts and is equipped with facilities for emergency coronary care, thrombolysis, and limited percutaneous coronary intervention (PCI) services. The study aimed to evaluate the prevalence of common cardiovascular risk factors and their relationship with in-hospital outcomes among patients aged over 40 years presenting with acute ST-segment elevation myocardial infarction (STEMI).

Participants

All consecutive patients aged over 40 years who were admitted to the Department of Medicine at Khulna Medical College Hospital with a confirmed diagnosis of acute ST-segment elevation myocardial infarction (STEMI) during the study period were considered eligible for inclusion. STEMI diagnosis was based on clinical presentation of typical chest pain lasting at least 20 minutes, accompanied by electrocardiographic evidence of ST-segment elevation of ≥1 mm in two or more contiguous limb leads or ≥2 mm in two or more contiguous precordial leads, or the presence of a new-onset left bundle branch block consistent with acute myocardial infarction. Elevated cardiac biomarkers (troponin I/T) were used to support the diagnosis. Only patients who presented within 24 hours of symptom onset were included.

Patients were excluded if they were 40 years of age or younger, had non-ST elevation myocardial infarction (NSTEMI) or unstable angina, or had undergone coronary artery bypass graft (CABG) surgery or percutaneous coronary intervention (PCI) within the preceding six months. Individuals with known chronic heart failure classified as New York Heart Association (NYHA) Class III or IV prior to the index admission, those with end-stage renal disease requiring dialysis, and patients who were unwilling or unable to provide informed consent were also excluded from the study.

Data Collection

Demographic details, including age and sex, as well as cardiovascular risk factors such as hypertension, diabetes mellitus, dyslipidemia, smoking status, obesity, and a family history of premature coronary artery disease, were recorded for each patient using a

structured case record form. Relevant past medical and treatment history was also documented at the time of admission to provide a comprehensive clinical profile.

Upon arrival at the hospital, all patients underwent a thorough physical examination, including assessment of heart failure severity using the Killip classification. A standard 12-lead electrocardiogram (ECG) was performed to confirm the diagnosis and identify the location of myocardial infarction. Cardiac biomarkers, specifically troponin I or troponin T, were measured to support the diagnosis and assess the extent of myocardial injury. Routine laboratory investigations included a complete blood count, fasting or random blood glucose, lipid profile, serum creatinine, and liver function tests. These investigations were used both for baseline assessment and to monitor treatment-related complications during hospitalization.

In-hospital outcomes evaluated in the study were mortality, recurrent myocardial infarction, arrhythmia (including atrial fibrillation, ventricular tachycardia or fibrillation, and heart block), cardiogenic shock, acute left ventricular failure, stroke, and length of hospital stay. All outcomes were prospectively recorded from the time of admission until discharge or death, ensuring comprehensive outcome assessment for every patient included in the study.

Statistical Analysis

Data were entered into a secure database and analyzed using the *Statistical Package for the Social Sciences* (SPSS) version 26. All variables were summarized using descriptive statistics. Categorical variables, including baseline characteristics, cardiovascular risk factors, and in-hospital outcomes, were presented as frequencies and percentages. Continuous variables, such as age, were expressed as mean ± standard deviation (SD). No inferential statistical tests were performed, as the objective of this analysis was to describe the distribution of patient characteristics, risk factors, and outcomes in the study population.

Results

Baseline Characteristics of the Study Population (n = 50)

All patients in the study (n = 50) were aged above 40 years, representing 100% of the study population. Of the total participants, 40 (80%) were male, and 10 (20%) were female. Regarding occupational status, 40 (80%) participants had sedentary occupations, while 10 (20%) were engaged in active occupations (Table 1).

Table 1: Baseline Characteristics of the Study Population (n = 50)

Variable	Frequency (n)	Percentage (%)
Age group (>40 years)	50	100
Sex		
Male	40	80
Female	10	20
Occupation		
Sedentary	40	80
Active	10	20

Distribution of Cardiovascular Risk Factors

Hypertension was present in 40 patients (80%), diabetes mellitus in 23 patients (46%), and dyslipidemia in 18 patients (36%). Based on body mass index (BMI) classification, 30 patients (60%) had normal BMI, 12 (24%) were overweight, and 8 (16%) were obese. A previous history of angina or acute myocardial infarction was documented in 14 patients (28%), and a family history of premature ischemic heart disease was reported in 16 patients (32%). Smoking was reported by 27 patients (54%), while alcohol consumption was reported by 4 patients (8%) (Table 2).

Table 2: Distribution of Cardiovascular Risk Factors (n = 50)

Risk Factor	Frequency (n)	Percentage (%)
Hypertension	40	80
Diabetes mellitus	23	46
Dyslipidemia	18	36
Body Mass Index (BMI)		
Normal	30	60
Obese	8	16
Overweight	12	24
Previous history of angina/acute MI	14	28
Family history of premature IHD	16	32
Smoking	27	54
Alcohol consumption	4	8

In-Hospital Outcomes of the Study Population

Heart failure was observed in 16 patients (32%), comprising 3 patients (6%) in Killip class II, 4 patients (8%) in Killip class III, and 9 patients (18%) in Killip class IV. No patients were classified as Killip class I. Post–myocardial infarction angina occurred in 6 patients (12%), and re-infarction was documented in 3 patients (6%). Arrhythmias were reported in 12 patients (24%), including ventricular tachycardia/fibrillation in 4 patients (8%), atrial fibrillation in 3 patients (6%), and complete heart block in 5 patients (10%). Cardiogenic shock was present in 9 patients (18%), mechanical complications (mitral regurgitation) in 2 patients (4%), and in-hospital death occurred in 7 patients (14%) (Table 3).

Table 3: In-Hospital Outcomes of the Study Population (n = 50)

Outcome	Frequency (n)	Percentage (%)
Heart failure (Killip class)		
Class I	0	0
Class II	3	6
Class III	4	8
Class IV	9	18
Total heart failure	16	32
Post-MI angina	6	12
Re-infarction	3	6
Arrhythmia		
Ventricular tachycardia/fibrillation	4	8
Atrial fibrillation	3	6
Complete heart block	5	10
Cardiogenic shock	9	18
Mechanical complication (MR)	2	4
Death	7	14

Discussion

This study was an observational analysis conducted on patients diagnosed with ST-segment-elevated myocardial infarction (STEMI) admitted to the Department of Medicine, Khulna Medical College Hospital, Khulna. The findings reveal that the majority of the patients were male, consistent with earlier studies in Bangladesh, which reported that the percentage of male STEMI patients ranged between 80-92%.[14, 15] This gender disparity in STEMI prevalence may be attributed to differences in lifestyle, hormonal influences, and risk factor profiles between males and females. Furthermore, cultural and social norms in Bangladesh often predispose males to risk behaviors such as smoking, which is a significant contributor to myocardial infarction.[16]

A striking observation was the high prevalence of sedentary occupational activities (80%) among the study population. This trend can be linked to the ongoing mechanization of agriculture and a substantial reliance on migrant labor in agricultural and other occupational sectors. A previous study reported a comparable distribution, with approximately 84% of individuals engaged in sedentary occupations and only 16% classified as moderately active.[17] The reduced physical activity associated with sedentary lifestyles is a well-known risk factor for the development of ischemic heart disease (IHD), likely contributing to the high burden of STEMI observed in this cohort.[18]

The study group exhibited a high prevalence of smoking (54%), family history of IHD (32%), dyslipidemia (36%), and elevated BMI. These findings indicate a significant clustering of traditional cardiovascular risk factors in the study population. Additionally, hypertension (80%), diabetes (46%), and a history of angina (28%) were notably high among the participants. When compared with findings from Khan et al., who reported smoking (84.4%), hypertension (46.9%), dyslipidemia (56.3%), diabetes (12.5%), and family history of IHD (34.4%) in young AMI patients, our study highlights a similar yet slightly varied risk factor profile.[19] The observed differences could reflect regional variations in lifestyle, genetics, and healthcare access.

Complications following STEMI were common, with older patients frequently experiencing heart failure (32%), arrhythmia (24%), cardiogenic shock (18%), post-MI angina (12%), and death (14%). These outcomes, although statistically not significant, align closely with previous studies. Notably, our results underscore that STEMI is associated with a significantly higher risk of mortality and cardiovascular events, echoing findings from similar research conducted in India. Chowdhury and Marsh, in their studies on young MI patients, reported in-hospital mortality rates ranging from 8-22%. This highlights the critical need for targeted intervention strategies to reduce mortality and improve outcomes in both young and older STEMI patients.[20, 21]

Overall, the findings emphasize the urgent necessity to address modifiable risk factors such as smoking, physical inactivity, and dyslipidemia. Additionally, early detection and management of comorbid conditions like hypertension and diabetes could play a pivotal role in mitigating the burden of STEMI in this population. Further research is warranted to explore the underlying determinants of the high prevalence of sedentary lifestyles and associated cardiovascular risks in this region.

Conclusion

This observational study highlights a predominant male burden of STEMI among patients admitted to Khulna Medical College Hospital, with a significant clustering of modifiable cardiovascular risk factors such as smoking, sedentary lifestyle, dyslipidemia, hypertension, and diabetes. The high prevalence of post-STEMI complications and mortality underscores the urgent need for comprehensive preventive strategies focusing on lifestyle modification and early management of comorbidities. Tailored public health interventions and further research into region-specific risk determinants are essential to reduce the burden of STEMI and improve patient outcomes in this population.

References

1. STEMI: The Most Severe Type of Heart Attack. Verywell Health. [cited 2025 Aug 9]. Available from: https://www.verywellhealth.com/stemi-st-segment-elevation-myocardial-infarction-1746032
2. Kim D-Y, Wala Z, Islam S, Islam R, Ahn M. Clinical characteristics and outcomes of ST-segment elevation myocardial infarction in a low income setting in rural Bangladesh. International Journal of Cardiology Heart & Vasculature. 2019;23:100376.
3. Islam M, Sultana ZZ, Iqbal A, Ali M, Hossain A. Effect of in-house crowding on childhood hospital admissions for acute respiratory infection: A matched case–control study in Bangladesh. International Journal of Infectious Diseases. 2021;105:639–45.
4. Seven Countries Study. Wikipedia. 2025 [cited 2025 Aug 9]. Available from: https://en.wikipedia.org/w/index.php?title=Seven_Countries_Study&oldid=1272697381
5. Khanam F, Hossain MdB, Mistry SK, Afsana K, Rahman M. Prevalence and Risk Factors of Cardiovascular Diseases among Bangladeshi Adults: Findings from a Cross-sectional Study. J Epidemiol Glob Health. 2019;9:176–84.
6. Chowdhury SR, Islam MdN, Sheekha TA, Kader SB, Hossain A. Prevalence and determinants of non-communicable diseases risk factors among reproductive-aged women: Findings from a nationwide survey in Bangladesh. PLoS One. 2023;18:e0273128.
7. Bleich S, Koehlmoos T, Rashid M, Anderson G. Noncommunicable chronic disease in Bangladesh: Overview of existing programs and priorities going forward. Health policy (Amsterdam, Netherlands). 2010;100:282–9.
8. Hajar R. Risk Factors for Coronary Artery Disease: Historical Perspectives. Heart Views. 2017;18:109–14.
9. Bitton A, Gaziano T. The Framingham Heart Study's Impact on Global Risk Assessment. Prog Cardiovasc Dis. 2010;53:68–78.
10. Claussen PA, Abdelnoor M, Kvakkestad KM, Eritsland J, Halvorsen S. Prevalence of risk factors at presentation and early mortality in patients aged 80 years or older with ST-segment elevation myocardial infarction. Vasc Health Risk Manag. 2014;10:683–9.
11. Bortnick AE, Shahid M, Shitole SG, Park M, Broder A, Rodriguez CJ, et al. Outcomes of ST-elevation myocardial infarction by age and sex in a low-income urban community: The Montefiore STEMI Registry. Clin Cardiol. 2020;43:1100–9.
12. Islam M, Islam K, Dalal K, Hossain Hawlader MD. In-house environmental factors and childhood acute respiratory infections in under-five children: a hospital-based matched case-control study in Bangladesh. BMC Pediatrics. 2024;24:38.
13. Khanam F, Hossain MdB, Mistry SK, Afsana K, Rahman M. Prevalence and Risk Factors of Cardiovascular Diseases among Bangladeshi Adults: Findings from a Cross-sectional Study. J Epidemiol Glob Health. 2019;9:176–84.
14. Karim MA, Majumder AAS, Islam KQ, Alam MB, Paul ML, Islam MS, et al. Risk factors and in-hospital outcome of acute ST segment elevation myocardial infarction in young Bangladeshi adults. BMC Cardiovascular Disorders. 2015;15:73.
15. Nasreen K, Ansary SA, Shume MM, Hawlader MDH, Aoishee ZA, Kumkum IJ, et al. Changing Trends in Infertility Among Couples Seeking

Treatment in Bangladesh: A Comparative Study (2007–2024). Sch Int J Obstet Gynec. 2025;8:102–14.

16. Chowdhury R, Naheed A, Monower MM, Shahzad S, Raqib R, Tasmin I, et al. Conventional and regionally distinctive risk factors for first-onset myocardial infarction: the Bangladesh Risk of Acute Vascular Events (BRAVE) case–control study. The Lancet Regional Health - Southeast Asia. 2025 [cited 2025 Aug 9];32. Available from: https://www.thelancet.com/journals/lansea/article/PIIS2772-3682(24)00169-0/fulltext
17. Michaliszyn SF, Faulkner MS. Physical Activity and Sedentary Behavior in Adolescents With Type 1 Diabetes. Res Nurs Health. 2010;33:441–9.
18. Lin W, Jiang X, Chen J, Yuan Y, Li Q, Wu H, et al. Global, regional and national burden of ischaemic heart disease attributable to high body mass index and low physical activity from 1990 to 2021. Diabetes Obes Metab. 2025;27:2561–72.
19. Khan AR, Majumder A a. S. Study of Lipid Profile and Coronary Angiographic Pattern in Young Bangladeshi Patients with Acute Coronary Syndrome. Cardiovascular Journal. 2009;1:183–8.
20. Mehta RH, Rathore SS, Radford MJ, Wang Y, Wang Y, Krumholz HM. Acute myocardial infarction in the elderly: differences by age. J Am Coll Cardiol. 2001;38:736–41.
21. Shamaki GR, Safiriyu I, Antia A, Abd El-Radi WK, Tinago CB, Ilonze O. Prevalence, predictors, and in-hospital outcomes of ST-elevation myocardial infarction among young adults without traditional cardiovascular risk factors in the United States. Am Heart J Plus. 2024;43:100408.