International Journal of Community Medicine and Public Health
Taher MA et al. Int J Community Med Public Health. 2026 Feb;13(2):546-551
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20260278

Original Research Article

Determinants associated with ST-elevation myocardial infarction

M. Abu Taher[1]*, M. Khairuzzaman[2], Shinjini Sarker[2], M. Shariful Alam[3], Mostafa Arif[4], Mizanur Rahman[5]

[1]Department of Community Medicine, Noakhali Medical College Hospital, Noakhali, Bangladesh
[2]Directorate General of Health Services, Attachment: Sir Salimullah Medical College Mitford Hospital, Dhaka, Bangladesh
[3]Department of Cardiology, Dhaka Medical College Hospital, Dhaka, Bangladesh
[4]Department of Medicine, Upazila Health Complex, Madhukhali, Faridpur, Bangladesh
[5]Department of Medicine, Sir Salimullah Medical College Mitford Hospital, Dhaka, Bangladesh

Received: 12 August 2025
Revised: 28 December 2025
Accepted: 26 January 2026

***Correspondence:**
Dr. M. Abu Taher,
E-mail: kariul@hotmail.com

ABSTRACT

Background: ST-elevation myocardial infarction (STEMI) is an acute coronary syndrome with a high fatality rate and is life-threatening. STEMI-related determinants for South Asian populations are significant to identify when preparing specific prevention strategies. STEMI-related determinants among a Bangladeshi population were the subject matter of this study.
Methods: A cross-sectional study was conducted at Sir Salimullah Medical College & Mitford Hospital, Dhaka, from June to December 2018. One hundred STEMI patients aged between 30-70 years who were purposively sampled and had ECG-confirmed ST-segment elevation were enrolled. Those with a previous cardiac event or chronic disease were excluded. Data collection was done through the collection of demographic data, cardiovascular risk factors, clinical measurements, and laboratory investigations. Independent determinants were determined using multivariate logistic regression analysis using SPSS v26.
Results: Mean age 52.5±13.1 years with male dominance (59%). Hypertension (HTN) was present in 63%, smoking in 47%, diabetes mellitus (DM) in 42%, and dyslipidemia in 22%. Age strata analysis revealed a significant association between age groups and the distribution of risk factors. Multivariate analysis revealed that age >50 years (AOR=2.85, p=0.008), male gender (AOR=1.74, p=0.001), HTN (AOR=3.25, p=0.004), DM (AOR=2.12, p=0.046), and smoking (AOR=2.50, p=0.012) were independent predictors for STEMI severity.
Conclusions: The traditional cardiovascular risk determinants remain the foremost predictors of STEMI among Bangladeshi populations. HTN was the strongest predictor, followed by DM and smoking. The findings emphasize the need for aggressive risk factor modification programs targeting modifiable determinants to reduce STEMI in Bangladesh.

Keywords: ST-elevation myocardial Infarction, Hypertension, Diabetes mellitus

INTRODUCTION

ST-elevation myocardial infarction (STEMI) is a serious manifestation of acute coronary syndrome, characterized by complete occlusion of a coronary artery with resultant transmural myocardial necrosis.[1] Acute myocardial infarction (AMI) is one of the most common causes of mortality in the developed world. The disease burden is close to 3 million people worldwide, and more than 1 million deaths per annum in the United States alone. The global burden of STEMI is still rising, particularly in low- and middle-income countries where cardiovascular

disease ranks as one of the leading causes of morbidity and mortality.[2] Risk factors for STEMI include HTN, hyperlipidemia, cigarette smoking, and diabetes, leading to the development of atherosclerosis and susceptibility to plaque instability. Such traditional cardiovascular risk factors are responsible for greater than 90% of the risk of AMI.[3] The pathophysiological mechanism of STEMI is typically atherosclerotic plaque rupture leading to thrombotic coronary artery occlusion and subsequent myocardial tissue necrosis.[4] Among South Asians, like Bangladesh, the epidemiological profile of cardiovascular disease presents uniquely challenging issues. Accompanying economic development and urbanization has been mounting obesity, dyslipidemia, DM, and HTN in these groups, elements combined with genetic predisposition that confer upon South Asians a unique cardiovascular risk profile. South Asians have a higher proportional cardiovascular disease mortality, and CVD incidence is very high in Bangladesh, and risk factors such as HTN and diabetes are also rising at a very fast pace among the elderly. Studies on modifiable risk factors of CVD, such as type 2 DM (T2DM), HTN, dyslipidemia, and smoking, have been conducted in Bangladesh and have shown to have a high burden of these illnesses. Population transition in Bangladesh, characterized by high urbanization and lifestyle changes, has been one of the main causes of increased risk factors for cardiovascular disease.[5] Certain emerging risk factors, like hypovitaminosis D, arsenic contamination of water and food stuff, particulate matter air pollution, may play a unique role in the Bangladeshi context. Understanding the determinants of STEMI is crucial to prevent it with specific measures and improve clinical outcomes. Age, gender, and occupational factors make a significant contribution to the risk profile of STEMI patients.[6] In STEMI patients, the common risk factors included HTN (47%), hypercholesterolemia (47%), current smoking (42%), and diabetes (27%). Numerous recent studies have demonstrated the significance of risk stratification on the basis of different demographic and clinical parameters.[7] Detection of high-risk patients at an early point in time with complete risk factor evaluation can lead to early intervention and potentially prevent adverse cardiovascular outcomes.[8] Interactions of various determinants with STEMI severity must be evaluated correctly to guide clinical decision-making and resource allocation.[9]

This study aims to identify the determinants of STEMI among a Bangladeshi population and provide insights into the local epidemiological patterns and risk factor profiles for directing public health actions and clinical practice guidelines.

METHODS

This cross-sectional study was conducted at Sir Salimullah Medical College and Mitford Hospital, Dhaka, from June to December 2018 among 100 purposively selected STEMI patients aged between 30 and 70 years with ST-segment elevation on ECG. History of cardiac events and chronic diseases was excluded. The information collected included demographic factors, cardiovascular risk factors (HTN, diabetes, smoking, dyslipidemia), and clinical parameters (BP and BMI). Laboratory examinations measured serum troponin-I (≥0.12 ng/ml diagnostic of MI), lipid profile, fasting glucose, and creatinine. Hospital complications like arrhythmias, heart failure, and mortality were evaluated in the patients. The study protocol was approved from the ethical point of view, and written informed consent was received from all subjects before recruitment. Standardized techniques were followed for clinical assessment and laboratory examinations.

Statistical analysis

Statistical analysis was performed using SPSS version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were presented as frequencies and percentages for categorical variables, while the mean±standard deviation was used for continuous variables. Student's t-test was employed to compare continuous variables between two groups, while the chi-square test was employed for categorical variables. Multivariate logistic regression was carried out in order to establish the independent predictors of STEMI severity, and AOR with 95% CI was used to present the findings. The significance level for all the analyses was set at a $p<0.05$.

RESULTS

Table 1 illustrates the age distribution of 100 STEMI patients covered in the study. The largest number of patients (34%) were aged between 41-50 years, representing the peak time of onset of STEMI in this category. The second largest group included 51-60 years old patients (27%), indicating unrelenting high risk in the sixth decade. Interestingly, 13% of the patients were above 60 years of age and 21% in the 31-40-year age group, pointing towards STEMI affecting a good number of comparatively younger individuals. Only 5% of the patients were 30 years or below. The mean age of 52.5±13.1 years in the range of 29-68 years reflects that STEMI predominantly affects middle-aged individuals in this Bangladeshi population. The comparatively high rate of patients under 50 years (26%) reflects the rising disease burden of premature coronary artery disease among developing countries like Bangladesh.

Table 1: Distribution of the study patients by age, (n=100).

Age (in years)	N	Percentage
≤30	5	5
31-40	21	21
41-50	34	34
51-60	27	27
>60	13	13
Mean±SD	52.5±13.1	

Figure 1 illustrates the sex distribution of STEMI patients during the trial and reveals a male excess. Males accounted for 59% and females for 41%, representing a ratio of males to females of almost 1.4:1. This concurs with known epidemiological patterns, where males are more likely to be at risk from STEMI.

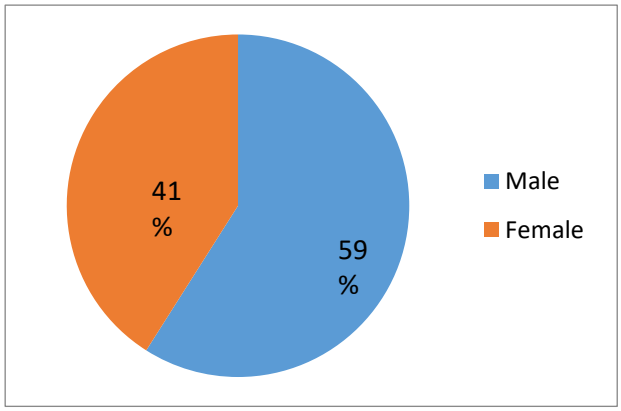

Figure 1: Sex distribution of the study patients.

Table 2 depicts the occupational distribution of the study participants, reporting striking socioeconomic patterns in STEMI development. Business executives represented the largest group (29%), followed by day laborers (26%), service workers (20%), and housewives (25%). The high proportion of housewives (25%) points to the rising epidemiological trends of increased prevalence of cardiovascular diseases in Bangladeshi women, which is due to household tension, changes in diet, and reduced physical activity.

Table 2: Occupation status of the study population, (n=100).

Occupations	N	Percentage
Business	29	29
Service	20	20
Day labour	26	26
Housewife	25	25

Table 3 describes the incidence of classic cardiovascular risk factors among the population studied. HTN was the most common risk factor, present in 63% of patients, although this result was not statistically significant (p=0.086). The high prevalence is expected globally and is also in accordance with the well-described strong association between HTN and coronary artery disease. Smoking was present in 47% of patients (p=0.987) and is a highly modifiable risk factor in this population. DM was noted in 42% of the patients (p=0.388), a reflection of the rising diabetes epidemic in South Asians. Dyslipidemia was noted in 22% of the patients (p=0.069), and it may be underestimated due to underdiagnosis or lack of frequent screening. Family history of coronary artery disease was noted in 27% of the patients (p=0.075), indicating a high genetic component in the pathogenesis of STEMI.

Table 4 presents remarkable age trends in the prevalence of cardiovascular risk factors among STEMI patients. The data show a clear age gradient for several of the risk factors, with increased HTN and DM among older patients. Prevalence of HTN increased exponentially with advancing age, from 23.1% in patients ≤40 years old to 70.5% in those between 41-60 years old and reaching up to 100% in those >60 years (p=0.001). Such a strong association reflects the natural course of HTN with aging. On the other hand, smoking followed a reverse trend with respect to age, being highest in the youngest age group (69.2%) and decreasing in older age groups (39.3% and 38.5% respectively, p=0.015). This pattern suggests smoking could be an important risk factor among youth with premature STEMI. DM prevalence increased with age, from 15.4% in the youngest to 61.5% in the oldest group (p=0.003), suggesting an age-related increase in insulin resistance and development of diabetes.

Table 5 examines occupational status and its relationship with cardiovascular risk factors and detects strong occupational health disparities. Day laborers presented with the greatest smoking prevalence (88.5%), which was significant (p=0.001), most probably because of socioeconomic determinants, stress coping strategies, and cultural patterns in this group of workers. This finding is of particular interest because it is a very common and modifiable risk factor in a very exposed population. HTN prevalence was high across business persons (72.4%), service workers (70.0%), and day laborers (73.1%), while housewives had much lower prevalence (36.0%, p=0.006). This pattern may be affected by occupational stress, lifestyle, and different healthcare accessibility patterns. Entrepreneurs and service workers had a higher prevalence of diabetes (55.2% and 50.0% respectively) compared with day laborers (34.6%) and homemakers (28%).

Table 6 (A) and (B) summarize the results of multivariate logistic regression analysis of independent determinants of STEMI severity.

Age ≥50 years was the strongest predictor (AOR=2.85, 95% CI: 1.31-6.20, p=0.008) and signifies that older patients are nearly three times more likely to present with severe STEMI. This is due to a cumulative effect of age on cardiovascular risk. The second strongest was HTN (AOR=3.25, 95% CI: 1.45-7.30, p=0.004), signifying that hypertensive patients are more than three times more likely to present with severe STEMI. This emphasizes the vital importance of control of blood pressure in the prevention of cardiovascular disease. Tobacco smoking carried a 2.5-fold elevated risk (AOR=2.50, 95% CI: 1.22-5.15, p=0.012), which signifies the deep impact of tobacco smoking on STEMI severity. Male gender carried increased risk (AOR=1.74, 95% CI: 0.92-3.27, p=0.001), as is widely known for cardiovascular disease patterns. DM doubled the risk (AOR=2.12, 95% CI: 1.01-4.45, p=0.046), while family history was moderately associated (AOR=1.89, p=0.04).

Table 3: Distribution of the study patients according to risk factors for STEMI, (n=100).

Risk factors	Yes		No		P value
	N	%	N	%	
HTN	63	63	37	37	0.086
Smoker	47	47	53	53	0.987
DM	42	42	58	58	0.388
Dyslipidemia	22	22	78	78	0.069
Family history of CAD	27	27	73	73	0.075

Table 4: Association between risk factors and age group of STEMI patients, (n=100).

Risk factors	≤40 years (n=26)	41-60 years (n=61)	>60 years (n=13)	P value
HTN	6 (23.1%)	43 (70.5%)	14 (100%)	0.001
Smoker	18 (69.2%)	24 (39.3%)	5 (38.5%)	0.015
DM	4 (15.4%)	30 (49.2%)	8 (61.5%)	0.003
Dyslipidemia	2 (7.7%)	17 (27.9%)	3 (23.1%)	0.121
Family history of CAD	5 (19.2%)	17 (27.9%)	5 (38.5%)	0.323

Table 5: Association between occupation and presence of risk factors for STEMI, (n=100).

Occupations	HTN	Smoker	DM	P value
Business	21 (72.4%)	15 (51.7%)	16 (55.2%)	0.032
Service	14 (70%)	5 (25%)	10 (50%)	0.049
Day labor	19 (73.1%)	23 (88.5%)	9 (34.6%)	0.001
Housewife	9 (36.0%)	4 (16%)	7 (28%)	0.006

Table 6 (A): Multivariate logistic regression analysis of determinants associated with STEMI severity.

Variables	Adjusted odds ratio	95% CI	P value
Age >50 years	2.85	1.31-6.20	0.008
Male sex	1.74	0.92-3.27	0.001
HTN	3.25	1.45-7.30	0.004
DM	2.12	1.01-4.45	0.046
Smoking	2.50	1.22-5.15	0.012
Family H/O CAD	1.89	0.89-4.03	0.04

Table 6 (B): Interpretation table: determinants associated with STEMI.

Determinants	Adjusted odds ratio	P value	Interpretation
Age >50 years	2.85	0.008	Older patients are nearly 3 times more likely to have STEMI.
Male sex	1.74	0.001	Males are more likely to have STEMI, but statistically significant.
HTN	3.25	0.004	Strong predictor; hypertensive patients are 3 times more likely to have STEMI.
DM	2.12	0.046	Diabetic patients have about 2 times higher risk of STEMI.
Smoking	2.50	0.012	Smokers are 2.5 times more likely to develop STEMI.
Family H/O CAD	1.89	0.040	Family history increases STEMI risk moderately.

DISCUSSION

This cross-sectional study of STEMI among a Bangladeshi population is important in providing insight into the cardiovascular risk profile of South Asian patients. The findings show a complex interaction between demographic, clinical, and behavioral variables to cause STEMI with possible utility in both public health policy and clinical practice.The population profile of the study is consistent with global epidemiological patterns of STEMI, with a predominance of middle-aged males (mean age 52.5±13.1 years) and a gender ratio of 1.4:1.[10] This is consistent with a previous study by Joshi et al where South Asians exhibit a higher overall rate of occurrence and a younger age of onset for AMI compared to Western nations.[11] The occupational profile confirms

that businesspeople and day laborers are the most common among STEMI patients and thus potentially have risk factors related to socio-economic and lifestyle factors.The load of the classical cardiovascular risk factors among our population is remarkable, such as HTN in 63% of patients, smoking in 47%, DM in 42%, and dyslipidemia in 22%.[12] All these findings are consistent with Karthikeyan et al which characterizes HTN, hyperlipidemia, smoking, and diabetes as key STEMI risk factors that have an association with the pathogenesis of atherosclerosis and the potential for plaque instability. High prevalence of these risk factors reflects South Asian populations' epidemiological transition due to urbanization and economic growth that resulted in increasing obesity, dyslipidemia, DM, and HTN, and genetic predisposition leading to a unique cardiovascular risk profile. The age-stratified analysis provides important information on risk factor prevalence by age. HTN displays a linear age-related gradient, occurring in 23.1% of patients ≤40 years, 70.5% of patients 41-60 years, and 100% of patients >60 years (p=0.001). This pattern is consistent with Pirola et al which established a connection between age and HTN as an increasing cardiovascular risk factor.[14] The prevalence of HTN was lowest, however, in the youngest age group (69.2%) and declined with increasing age, implying generational distinctions in smoking behavior patterns. Multivariate logistic regression identifies several independent predictors of STEMI severity. Age >50 years was a strong predictor (AOR=2.85, 95% CI: 1.31-6.20, p=0.008), in line with well-established cardiovascular epidemiology.[15] Despite enhanced understanding of cardiovascular risk factors and increased focus on preventive cardiology, STEMI patients over the past decades are increasingly obese and younger, with increased prevalence of smoking, HTN, and DM. Male was strongly associated (AOR=1.74, p=0.001), reflecting gendered variations in cardiovascular risk. HTN had the strongest association with STEMI severity (AOR=3.25, 95% CI: 1.45-7.30, p=0.004), reflecting its central role as a modifiable risk factor.[16] Age, education, wealth, exercise, alcohol, and BMI are risk factors due to increased HTN risk in South Asian groups.[17] DM (AOR=2.12, p=0.046) and smoking (AOR=2.50, p=0.012) also emerged as independent predictors. The occupational profile reveals interesting patterns, in that the day laborers had the highest rate of smoking (88.5%) but lower rates of diabetes (34.6%), while businesspersons and service holders had a higher rate of diabetes.[18] This points towards occupation-specific risk profiles, most probably owing to lifestyle, socioeconomic status, and access to health care. Corresponding to other South Asians, Bangladeshis are inappropriately prone to the development of coronary artery disease, and it is often premature.[19] Findings underscore the need for targeted prevention efforts at modifiable risk factors, particularly control of HTN, smoking cessation, and diabetes management. The study presents informative epidemiological data to guide the implementation of evidence-based cardiovascular disease prevention programs to address the Bangladeshi population's unique risk profile.

Limitations

The cross-sectional design of the study limits causal inference between the STEMI event and risk factors. The relatively small sample size of 100 patients from a single center may limit generalization to the general Bangladeshi population. The study did not control for potential confounders such as socioeconomic status, drug adherence, or genes that might influence STEMI risk.

CONCLUSION

This study identifies HTN, smoking, DM, advanced age, and male gender as significant independent determinants of STEMI in the Bangladeshi population. HTN was noted to be the strongest predictor with a threefold increased risk, emphasizing its pivotal role in the pathogenesis of STEMI. High prevalence of modifiable risk factors underlines the pressing need for extensive cardiovascular disease prevention measures. These findings are valuable epidemiological data to apply in the planning of targeted public health interventions and clinical practice guidelines specific to the unique cardiovascular risk profile of the Bangladeshi population.

Recommendations

Subsequent study needs to employ larger, multicenter prospective cohort studies to establish temporal relationships between risk factors and STEMI occurrence. Identification of novel risk factors specific to South Asians, including genetic markers, dietary patterns, and environmental exposures, would add value to risk stratification. Implementation of cardiovascular disease prevention programs at the community level targeting modifiable risk factors, particularly HTN and smoking, should take precedence. Population-based risk assessment instruments using local epidemiologic data would improve clinical decision-making and resource allocation.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Thygesen K, Alpert JS, Jaffe AS, Chaitman BR, Bax JJ, Morrow DA, et al. Fourth universal definition of myocardial infarction (2018). Circulation. 2018;138(20):e618-51.
2. Nowbar AN, Gitto M, Howard JP, Francis DP, Al-Lamee R. Mortality from ischemic heart disease: Analysis of data from the World Health Organization and coronary artery disease risk factors From NCD Risk Factor Collaboration. Circulation. 2019;12(6):e005375.

3. Yusuf S, Hawken S, Ôunpuu S, Dans T, Avezum A, Lanas F, et al. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. The lancet. 2004;364(9438):937-52.
4. Libby P, Theroux P. Pathophysiology of coronary artery disease. Circulation. 2005;111(25):3481-8.
5. Islam AM, Majumder AA. Coronary artery disease in Bangladesh: A review. Indian Heart J. 2013;65(4):424-35.
6. Mehta RH, Rathore SS, Radford MJ, Wang Y, Wang Y, Krumholz HM. Acute myocardial infarction in the elderly: differences by age. J Am College Cardiol. 2001;38(3):736-41.
7. Eagle KA, Lim MJ, Dabbous OH, Pieper KS, Goldberg RJ, Van de Werf F, et al. A validated prediction model for all forms of acute coronary syndrome: estimating the risk of 6-month postdischarge death in an international registry. JAMA. 2004;291(22):2727-33.
8. D'Agostino Sr RB, Vasan RS, Pencina MJ, Wolf PA, Cobain M, Massaro JM, et al. General cardiovascular risk profile for use in primary care: the Framingham Heart Study. Circulation. 2008;117(6):743-53.
9. Granger CB, Goldberg RJ, Dabbous O, Pieper KS, Eagle KA, Cannon CP, et al. Predictors of hospital mortality in the global registry of acute coronary events. Arch Internal Med 2003;163(19):2345-53.
10. Gupta MD, Girish MP, Kategari A, Batra V, Gupta P, Bansal A, et al. Epidemiological profile and management patterns of acute myocardial infarction in very young patients from a tertiary care center. Indian Heart J. 2020;72(1):32-9.
11. Joshi P, Islam S, Pais P, Reddy S, Dorairaj P, Kazmi K, et al. Risk factors for early myocardial infarction in South Asians compared with individuals in other countries. JAMA. 2007;297(3):286-94.
12. Maahs DM, Daniels SR, De Ferranti SD, Dichek HL, Flynn J, Goldstein BI, et al. Cardiovascular disease risk factors in youth with diabetes mellitus: a scientific statement from the American Heart Association. Circulation. 2014;130(17):1532-58.
13. Karthikeyan T, Raja M, Radha D, Gaur T A, Geetha J, Sakthivadivel V. Risk factors and inflammatory markers in acute coronary syndrome-ST elevation myocardial infarction (STEMI). Hormone Molecular Biol Clin Investigation. 2023;44(2):115-20.
14. Pirola CJ, Sookoian S. Age but not sex may explain the negative effect of arterial hypertension and diabetes on COVID-19 prognosis. J Infect. 2020;81(4):647-79.
15. Andersson C, Vasan RS. Epidemiology of cardiovascular disease in young individuals. Nature Rev Cardiol. 2018;15(4):230-40.
16. Vernon ST, Coffey S, Bhindi R, Soo Hoo SY, Nelson GI, Ward MR, et al. Increasing proportion of ST elevation myocardial infarction patients with coronary atherosclerosis poorly explained by standard modifiable risk factors. Europ J Prevent Cardiol. 2017;24(17):1824-30.
17. Hossain FB, Adhikary G, Chowdhury AB, Shawon MS. Association between body mass index (BMI) and hypertension in south Asian population: evidence from nationally-representative surveys. Clin Hypert. 2019;25:1-9.
18. Lim MS, Park B, Kong IG, Sim S, Kim SY, Kim JH, et al. Leisure sedentary time is differentially associated with hypertension, diabetes mellitus, and hyperlipidemia depending on occupation. BMC Pub Health. 2017;17:1-9.
19. Stefil M, Bell J, Calvert P, Lip GY. Heightened risks of cardiovascular disease in South Asian populations: causes and consequences. Expert Rev Cardiov Therapy. 2023;21(4):281-91.

Cite this article as: Taher MA, Khairuzzaman M, Sarker S, Alam MS, Arif M, Rahman M. Determinants associated with ST-elevation myocardial infarction. Int J Community Med Public Health 2026;13:546-51.