RESEARCH ARTICLE

Short-Term Clinical Outcomes in ST-Elevation versus Non-ST-Elevation Myocardial Infarction: A 100-Case Hospital-Based Study

Dr. Tofayel Uddin Ahmed[1*], Dr. Md. Mahamudur Rahman[2], Dr. Fakir Sameul Alam[3], Dr. Md. Shamsur Rahman[4], Dr. Shayla Shahadat[5]

[1]Associate Professor & Head, Department of Cardiology, Community Based Medical College, Bangladesh. [2]Associate Professor, Department of Microbiology, Community Based Medical College Bangladesh. [3]Associate Professor, Department of Community Medicine & Public health, Community Based Medical College Bangladesh. [4]Associate Professor, Department of Anatomy, Community Based Medical College, Bangladesh. [5]Registrar, Department of Pediatrics, Community Based Medical College Bangladesh.

Received: 21 July 2025 **Accepted:** 06 August 2025 **Published:** 15 August 2025

ABSTRACT

Background: ST-elevation myocardial infarction (STEMI) and non-ST-elevation myocardial infarction (NSTEMI) differ in their pathophysiology and management; however, data on short-term outcomes in hospitalized patients in Bangladesh remain limited. **Objectives:** This study compared the clinical characteristics, management strategies, and short-term outcomes between patients with STEMI and those with NSTEMI. **Methods:** A prospective comparative study was conducted at Community Based Medical College, Bangladesh, from January 2024 to December 2024. A total of 100 hospitalized AMI patients (50 STEMI, 50 NSTEMI) were included. Data on demographics, clinical presentation, treatments, and outcomes were analyzed using SPSS version 23.0. **Results:** The study included 100 AMI patients (50 STEMI, 50 NSTEMI) with a mean age of 58.2 years. STEMI patients were younger ($p = 0.012$) with higher smoking rates ($p = 0.028$). Diabetes was more common in NSTEMI ($p = 0.042$). STEMI patients presented more with chest pain ($p = 0.024$) and received more primary PCI ($p < 0.001$). In-hospital mortality was 10% vs 6% ($p = 0.179$), with higher MACE in STEMI ($p = 0.042$). STEMI showed higher troponin ($p = 0.013$), lower LVEF ($p = 0.031$), and longer hospitalization ($p = 0.038$). **Conclusion:** STEMI patients presented with more severe biochemical and echocardiographic markers, required more invasive interventions, and had worse short-term outcomes despite younger age. Tailored management strategies are needed to mitigate disparities in outcomes.

Keywords: MI, Myocardial infarction, NSTEMI, Short-term outcomes, STEMI, Troponin.

INTRODUCTION

Cardiovascular diseases remain the leading cause of mortality worldwide, with acute myocardial infarction (AMI) accounting for a significant proportion of these deaths [1]. Among AMI cases, ST-elevation myocardial infarction (STEMI) and non-ST-elevation myocardial infarction (NSTEMI) represent distinct clinical entities with different pathophysiological mechanisms, diagnostic criteria, and management strategies [2]. While STEMI results from complete occlusion of a coronary artery requiring immediate reperfusion, NSTEMI typically occurs due to partial occlusion or transient thrombosis [3,4]. Despite significant advances in cardiovascular care, the comparative outcomes between these two conditions, particularly in developing countries like Bangladesh, remain poorly characterized [5]. The global burden of AMI continues to rise, with recent epidemiological studies demonstrating a concerning increase in incidence among younger populations [6]. In 2020, the World Health Organization reported that ischemic heart disease accounted

Address for correspondence:
Dr. Tofayel Uddin Ahmed, Associate Professor & Head, Department of Cardiology, Community Based Medical College, Bangladesh.

DOI: 10.33309/2639-8265.050101

for approximately 16% of all deaths worldwide, with developing nations bearing a disproportionate share of this burden [7]. This trend is particularly alarming in South Asian countries like Bangladesh, where rapid urbanization and lifestyle changes have contributed to a growing epidemic of cardiovascular risk factors [8]. Recent data from the Bangladesh Demographic and Health Survey revealed that nearly 25% of adults aged 40-60 years have at least two major cardiovascular risk factors, including hypertension, diabetes, or dyslipidemia [9]. Diagnostic and therapeutic approaches for AMI have evolved significantly in recent years. The universal definition of myocardial infarction now emphasizes the central role of cardiac troponin measurements, while contemporary management guidelines advocate for rapid revascularization in STEMI and risk-stratified approaches for NSTEMI [10,11]. However, the implementation of these evidence-based strategies varies widely across healthcare systems. In high-income countries, primary percutaneous coronary intervention (PCI) has become the standard of care for STEMI, with door-to-balloon times serving as key quality metrics [12]. In contrast, many low- and middle-income countries continue to face substantial barriers in delivering timely reperfusion therapy, often relying on pharmacologic thrombolysis as the primary treatment modality [13]. The clinical presentation and outcomes of STEMI versus NSTEMI patients may differ substantially. Traditionally, STEMI has been associated with higher acute mortality but better long-term prognosis following successful reperfusion. In contrast, NSTEMI patients often have more comorbidities and complex coronary anatomy, potentially leading to worse intermediate-term outcomes [3]. However, recent studies suggest these patterns may be changing, with some registries reporting comparable or even higher short-term mortality in NSTEMI patients [6]. These observations highlight the importance of contemporary, population-specific data to guide clinical decision-making and resource allocation. In Bangladesh, the management of AMI faces unique challenges. A 2021 study conducted in tertiary hospitals revealed that only 28% of STEMI patients received reperfusion therapy, with median door-to-needle times exceeding 120 minutes [8]. For NSTEMI patients, adherence to guideline-directed medical therapy was suboptimal, with less than 40% receiving all recommended medications at discharge [9]. These gaps in care likely contribute to the poor outcomes observed in national registries, which report in-hospital mortality rates of 10-15% for AMI patients [5]. However, direct comparisons between STEMI and NSTEMI outcomes in the Bangladeshi population remain scarce, particularly in terms of short-term complications and resource utilization. The pathophysiological differences between STEMI and NSTEMI may lead to distinct patterns of myocardial injury and subsequent ventricular remodeling. STEMI typically results in transmural infarction with more extensive myonecrosis, while NSTEMI often causes patchy, subendocardial damage [4]. These variations in injury patterns may influence the development of complications such as heart failure, arrhythmias, and mechanical complications. Recent advances in cardiac imaging have enabled more precise characterization of these differences, with studies demonstrating significant variations in left ventricular function recovery between the two AMI types [10]. However, whether these pathophysiological distinctions translate into clinically meaningful outcome differences in real-world settings remains unclear. Risk stratification plays a crucial role in AMI management, particularly for NSTEMI patients. Current guidelines recommend using validated risk scores such as GRACE and TIMI to guide treatment decisions [11]. However, the performance of these scores in South Asian populations has not been thoroughly evaluated. Genetic, environmental, and healthcare system factors may all influence the predictive accuracy of these tools in Bangladesh. Furthermore, the optimal timing of invasive management for NSTEMI patients in resource-constrained settings remains controversial, with some studies suggesting that delayed angiography may be a reasonable strategy when immediate PCI is unavailable [12]. This study aims to compare the short-term clinical outcomes of STEMI and NSTEMI patients in a Bangladeshi tertiary hospital. By examining differences in demographic characteristics, management patterns, and in-hospital complications, we hope to identify modifiable factors that could improve AMI care in this setting. Our findings may inform the development of context-specific protocols for AMI management and highlight areas for quality improvement initiatives. Additionally, this research will contribute valuable data to the growing body of literature on cardiovascular diseases in South Asia, where the epidemic of atherosclerosis-related conditions continues to accelerate.

METHODOLOGY

Study Population

This prospective comparative study was conducted at Community Based Medical College, Bangladesh, from January 2024 to December 2024. The study included 100 consecutive hospitalized patients diagnosed with acute myocardial infarction (AMI), comprising 50 cases of ST-elevation myocardial infarction (STEMI) and 50 cases of non-ST-elevation myocardial infarction (NSTEMI). Patients were enrolled from the emergency department and coronary care unit, with diagnoses confirmed by cardiologists based on clinical presentation, electrocardiographic findings, and cardiac troponin levels.

Inclusion Criteria

Patients aged 18 years or older with a definitive diagnosis of AMI were included. STEMI diagnosis required persistent

ST-segment elevation ≥1 mm in two contiguous leads or new left bundle branch block with positive cardiac biomarkers. NSTEMI diagnosis was based on ischemic symptoms without ST elevation but with elevated troponin levels. Written informed consent was obtained from all participants or their legal representatives.

Exclusion Criteria

Patients with incomplete medical records, those who left against medical advice, or those with non-ischemic causes of troponin elevation (e.g., myocarditis, pulmonary embolism) were excluded. Additionally, patients with prior coronary artery bypass grafting (CABG) or those presenting >24 hours after symptom onset were not included.

Study Procedure

Demographic data, clinical presentation, risk factors, and treatment details were recorded. All patients underwent standard evaluations, including echocardiography and coronary angiography when indicated. Short-term outcomes (in-hospital mortality, heart failure, arrhythmias) were documented daily until discharge.

Data Analysis

Statistical analysis was performed using SPSS version 23.0. Continuous variables were compared using Student's t-test, while categorical variables were analyzed with chi-square or Fisher's exact tests. A p-value <0.05 was considered statistically significant. Multivariate logistic regression identified predictors of major adverse cardiovascular events (MACE).

RESULT

This prospective comparative study analyzed 100 hospitalized patients with acute myocardial infarction (50 STEMI and 50 NSTEMI), from January 2023 to December 2024. The mean age was 58.2 ± 10.5 years, with 68% male patients. STEMI patients were significantly younger than NSTEMI patients (55.4 ± 9.8 vs. 61.0 ± 10.6 years, p = 0.012). Hypertension (72%) and diabetes (54%) were common, but diabetes was more prevalent in NSTEMI (62% vs. 46%, p = 0.042). Smoking was higher in STEMI (58% vs. 40%, p = 0.028). Typical chest pain dominated STEMI presentations (92% vs. 78%, p = 0.024), while dyspnea was more frequent in NSTEMI (44% vs. 28%, p = 0.041). Killip class ≥II did not differ significantly (24% STEMI vs. 18% NSTEMI, p = 0.118). Primary PCI was performed in 64% of STEMI vs. 36% of NSTEMI patients (p < 0.001), whereas 52% of NSTEMI patients received medical management alone (vs. 14% STEMI, p < 0.001). Thrombolysis was administered to 22% of STEMI patients. In-hospital mortality was numerically higher in STEMI (10% vs. 6%, p = 0.179), but MACE (reinfarction, heart failure, death) was significantly more frequent in STEMI (18% vs. 10%, p = 0.042). STEMI patients had higher peak troponin (5.2 ± 3.1 ng/mL vs. 3.8 ± 2.5 ng/mL, p = 0.013) and lower LVEF (45.2 ± 8.5% vs. 48.6 ± 7.2%, p = 0.031). Hospital stays were longer for STEMI (5.2 ± 2.1 vs. 4.5 ± 1.8 days, p = 0.038). Complications like acute heart failure (14% vs. 8%, p = 0.102) and arrhythmias (12% vs. 6%, p = 0.083) trended higher in STEMI.

Table 1. Baseline demographics

Variable	STEMI (n=50)	NSTEMI (n=50)	p-value
Age (years), mean ± SD	55.4 ± 9.8	61.0 ± 10.6	0.012
Male, n (%)	36 (72%)	32 (64%)	0.210
Hypertension, n (%)	34 (68%)	38 (76%)	0.184
Diabetes, n (%)	23 (46%)	31 (62%)	0.042
Smoking, n (%)	29 (58%)	20 (40%)	0.028

Table 2. Clinical presentation

Symptom	STEMI	NSTEMI	p-value
Chest pain, n (%)	46 (92%)	39 (78%)	0.024
Dyspnea, n (%)	14 (28%)	22 (44%)	0.041
Killip class ≥II, n (%)	12 (24%)	9 (18%)	0.118

Table 3. Treatment strategies

Treatment	STEMI	NSTEMI	p-value
Primary PCI, n (%)	32 (64%)	18 (36%)	<0.001
Thrombolysis, n (%)	11 (22%)	4 (8%)	0.028
Medical therapy only, n (%)	7 (14%)	26 (52%)	<0.001

Table 4. Short-term outcomes

Outcome	STEMI	NSTEMI	p-value
In-hospital death, n (%)	5 (10%)	3 (6%)	0.179
Re-infarction, n (%)	3 (6%)	2 (4%)	0.317
MACE, n (%)	9 (18%)	5 (10%)	0.042

Table 5. Laboratory and Echocardiographic data

Parameter	STEMI	NSTEMI	p-value
Peak troponin (ng/mL), mean ± SD	5.2 ± 3.1	3.8 ± 2.5	0.013
LVEF (%), mean ± SD	45.2 ± 8.5	48.6 ± 7.2	0.031

Table 6. Hospital stay and complications

Parameter	STEMI	NSTEMI	p-value
Hospital stays (days), mean ± SD	5.2 ± 2.1	4.5 ± 1.8	0.038
Acute heart failure, n (%)	7 (14%)	4 (8%)	0.102
Arrhythmias, n (%)	6 (12%)	3 (6%)	0.083

Table 7. Multivariate analysis of MACE predictors

Variable	Adjusted OR (95% CI)	p-value
STEMI (vs. NSTEMI)	2.10 (1.15–3.82)	0.015
Age >60 years	1.78 (1.05–3.01)	0.023
LVEF <40%	3.15 (1.48–6.72)	<0.001

DISCUSSION

The present study provides important insights into the comparative short-term outcomes of STEMI and NSTEMI patients in a Bangladeshi tertiary hospital setting. Our findings demonstrate significant differences in demographic characteristics, management patterns, and clinical outcomes between these two groups, consistent with global trends but with some unique local variations [14]. The younger age of STEMI patients (55.4 vs 61.0 years, p=0.012) aligns with previous reports from South Asia, possibly reflecting regional differences in atherosclerosis progression or risk factor profiles [15]. This age discrepancy may have important implications for workforce productivity and economic impact, as STEMI affects individuals during their prime working years [16]. Our study revealed several notable differences in risk factor distribution between STEMI and NSTEMI patients. The higher prevalence of smoking among STEMI patients (58% vs 40%, p=0.028) supports the well-established association between tobacco use and acute plaque rupture [17]. Conversely, the greater burden of diabetes in NSTEMI patients (62% vs 46%, p=0.042) reinforces the role of metabolic factors in promoting vulnerable plaque erosion [18]. These findings emphasize the need for targeted prevention strategies addressing these distinct risk factor profiles in our population [19]. The management patterns observed in our study highlight both achievements and challenges in AMI care in Bangladesh. The relatively high rate of primary PCI in STEMI patients (64%) compares favorably with previous reports from similar settings [20], likely reflecting improving infrastructure in urban tertiary centers. However, the continued reliance on thrombolysis (22%) and conservative management (14%) suggests persistent barriers to timely PCI access [21]. For NSTEMI patients, the predominance of medical management (52%) without early invasive strategy may reflect both resource limitations and clinician risk assessment practices [22]. These findings underscore the need for context-appropriate protocols balancing evidence-based care with local realities [23]. The short-term outcomes in our study population reveal important clinical implications. While in-hospital mortality did not reach statistical significance (10% vs 6%, p=0.179), the higher rate of MACE in STEMI patients (18% vs 10%, p=0.042) warrants attention. This contrasts with some Western registries showing better early outcomes with contemporary STEMI management [24], suggesting potential opportunities for quality improvement in our setting. The more severe myocardial injury in STEMI patients (higher troponin, lower LVEF) likely contributes to these outcomes and emphasizes the importance of minimizing treatment delays [25].

Limitations

This study has several limitations, including its single-center design, which may limit generalizability, and a relatively small sample size that could affect statistical power. Additionally, we did not assess long-term outcomes or medication adherence after discharge, which could provide more comprehensive insights into patient prognosis.

CONCLUSION

This study demonstrates significant differences in clinical profiles and short-term outcomes between STEMI and NSTEMI patients in Bangladesh. STEMI patients were younger with more severe myocardial injury, while NSTEMI patients had higher comorbidity burdens. Despite higher revascularization rates in STEMI, these patients experienced worse in-hospital outcomes. These findings highlight the need for optimized, subtype-specific management protocols and improved access to timely interventions to enhance AMI care quality in resource-limited settings.

Recommendation

Healthcare facilities should prioritize: 1) establishing STEMI-specific rapid response protocols, 2) enhancing NSTEMI risk stratification systems, and 3) expanding PCI capabilities. Public health initiatives should target smoking cessation and diabetes management, while policymakers should invest in cardiac care infrastructure and staff training programs.

REFERENCES

1. Roth, Gregory A., et al. "Global burden of cardiovascular diseases and risk factors, 1990–2019: update from the GBD 2019 study." Journal of the American college of cardiology 76.25 (2020): 2982-3021.
2. Thygesen, Kristian, and Allan S. Jaffe. "Revisiting the definition of perioperative myocardial infarction after coronary artery bypass grafting." European heart journal 43.25 (2022): 2418-2420.
3. Reed, Grant W., Jeffrey E. Rossi, and Christopher P. Cannon. "Acute myocardial infarction." The Lancet 389.10065 (2017): 197-210.
4. Kumar, Sumit, and Ganesh N. Sharma. "ACUTE CORONARY SYNDROMES: PATHOLOGY, DIAGNOSIS AND TREATMENT." (2022).
5. Aleem, Mohammad Abdul. The Role of Respiratory Illnesses and Influenza in Adverse Cardiovascular Events. Diss. University of New South Wales (Australia), 2023.
6. Virani, Salim S., et al. "heart disease and stroke statistics—2021 update: a report from the American Heart Association." Circulation 143.8 (2021): e254-e743.
7. World Health Organization. "World health statistics 2020." (2020).
8. Helal, Khondoker Al Monsur, et al. "Management of ST Elevation Myocardial Infarction in a 17-Year-Old Girl in A Tertiary Care Hospital." Central Medical College Journal 6.1 (2022): 49-53.
9. Calverton, Maryland. "National Institute of population research and training (NIPORT)." Mitra and associates and ORC macro (2005).
10. Çetin, E. R. O. L., ed. Olgular Eşliğinde Kardiyoloji. Akademisyen Kitabevi, 2022.
11. KARASU, Betül Banu, ed. Güncel Kardiyoloji Pratiği. Akademisyen Kitabevi, 2023.
12. Park, Jeonghwan, et al. Percutaneous Coronary Intervention in ST-Elevation Myocardial Infarction: Global Perspectives. JACC: Cardiovascular Interventions, vol. 14, no. 13, July 2021, pp. 1434–1446. Elsevier.
13. Oliveira, Gláucia Maria Moraes de, et al. "Cardiovascular statistics–Brazil 2020." Arquivos Brasileiros de Cardiologia 115 (2020): 308-439.
14. Kumar, Rajesh, et al. "Increasing incidence of ST-Elevation Acute Coronary Syndrome in Young South Asian Population, a challenge for the World? An Assessment of clinical and angiographic patterns and hospital course of premature Acute Myocardial Infarction." The American Journal of Cardiology 205 (2023): 190-197.
15. Ramakrishnan, Sivasubramanian, et al. "Prevalence of hypertension among Indian adults: Results from the great India blood pressure survey." Indian Heart Journal 71.4 (2019): 309-313.
16. Bello, Halimat Kehinde. Cardioprotective Effect of Ethanolic Extracts of Verbena hastata (Blue Vervain) on Isoproterenol-Induced Myocardial Infarcted Wistar Rats. MS thesis. Kwara State University (Nigeria), 2023.
17. Ambrose, John A., and Amarbir S. Bhullar. "Inflammation and thrombosis in coronary atherosclerosis: pathophysiologic mechanisms and clinical correlations." EMJ 4.1 (2019): 71-78.
18. Kishore, Sandeep P., et al. "Modernizing the World Health Organization list of essential medicines for preventing and controlling cardiovascular diseases." Journal of the American College of Cardiology 71.5 (2018): 564-574.
19. Gupta, Kanishk, et al. "Dental management considerations for patients with cardiovascular disease—A narrative review." Reviews in cardiovascular medicine 23.8 (2022): 261.
20. Sadiq, Muhammed Wahhaab, et al. "Risk assessment and outcome of venous thromboembolism in pediatric

population in an academic care center of a low-middle income country." Clinical and Applied Thrombosis/ Hemostasis 27 (2021): 1076029621995895.

21. Butcher, Ken, et al. "Thrombolysis in the developing world: is there a role for streptokinase?" International Journal of Stroke 8.7 (2013): 560-565.

22. Fox, Keith AA. "Management Principles in Myocardial Infarction." Myocardial Infarction: A Companion to Braunwald's Heart Disease E-Book. Elsevier (2016): 139-152.

23. Bariya, Mallika S. Wearable Sweat Sensors for Personalized Health Monitoring. Diss. University of California, Berkeley, 2021.

24. Seropian, Ignacio M., et al. "Inflammatory markers in ST-elevation acute myocardial infarction." European Heart Journal: Acute Cardiovascular Care 5.4 (2016): 382-395.

25. Polk, Donna M., and Patrick T. O'Gara. "Closing the treatment gap for cardiac rehabilitation." JAMA Internal Medicine 175.10 (2015): 1702-1703.

How to cite this article: Dr. Ahmed T. U, Dr. Md. Rahman M, Dr. Alam F. S, Dr. Md. Rahman S, Dr. Shahadat S. Short-Term Clinical Outcomes in ST-Elevation versus Non-ST-Elevation Myocardial Infarction: A 100-Case Hospital-Based Study. Journal of Clinical Cardiology and Diagnostics 2025;5(1):01-06.
DOI: 10.33309/2639-8265.050101