Original Article

Prevalence of acute coronary syndrome among patients presenting

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Abstract

Background: *Acute coronary syndrome (ACS) remains a major cause of morbidity and mortality worldwide, with various risk factors contributing to its prevalence. This study aimed to assess the prevalence of ACS among patients presenting with chest pain at a tertiary care cardiac center in Cumilla, Bangladesh.* ***Methods:*** *A cross-sectional observational study was conducted at Eastern Medical College and Hospital, Cumilla, from July 2023 to June 2024. A total of 300 patients, diagnosed with ACS based on clinical, electrocardiographic, and biochemical criteria, were included. Demographic characteristics, risk factors, clinical presentations, ACS subtypes, and management strategies were analyzed. Data were analyzed using descriptive and inferential statistical methods.* ***Results:*** *The study population predominantly consisted of male patients (70%) with a mean age of 52.8 years. The highest prevalence of ACS was observed in patients aged 40–59 years (50%), followed by those ≥60 years (30%). The most common risk factors for ACS included hypertension (60%), smoking (50%), and diabetes mellitus (40%). The most prevalent ACS subtype was ST-segment elevation myocardial infarction (STEMI) (45%), followed by non-ST-segment elevation myocardial infarction (NSTEMI) (35%) and unstable angina (20%). Chest pain was the predominant symptom in all patients (100%), while other common symptoms included dyspnea (30%) and nausea/vomiting (20%). In terms of management, 50% of patients received thrombolysis, 25% underwent percutaneous coronary intervention (PCI), and 10% required coronary artery bypass grafting (CABG). Short-term outcomes revealed a high discharge rate (90%) and an in-hospital mortality rate of 10%.* ***Conclusion:*** *This study's findings show a considerable prevalence of ACS, a greater incidence of STEMI, and a clear connection with modifiable risk factors such as hypertension, diabetes, and smoking. Early intervention, such as thrombolysis and PCI, resulted in much better short-term outcomes. Bangladesh urgently requires public health efforts to prevent and manage ACS risk factors.*

Keywords: *Acute coronary syndrome, prevalence, risk factors, STEMI, NSTEMI, ACS management, Bangladesh*

Introduction: Acute coronary syndrome (ACS) refers to a variety of acute cardiovascular diseases, including unstable angina, non-ST-elevation myocardial infarction (NSTEMI), and ST-elevation myocardial infarction (STEMI). It is caused by the rupture of atherosclerotic plaques and thrombus development, which results in myocardial ischaemia. ACS contributes considerably to the morbidity and mortality associated with ischaemic heart disease, which accounts for more than 31% of deaths globally[1,2]. In South Asia, particularly Bangladesh, the incidence of ACS is increasing due to urbanisation, lifestyle alterations, and increased cardiovascular risk factors such as hypertension, diabetes, dyslipidaemia, and tobacco consumption[3,4].

The epidemiology of ACS in low- and middle-income countries reveals a younger age of initiation and a greater frequency of avoidable risk factors when compared to developed nations[5].

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Delays in seeking medical assistance, restricted access to modern diagnostics, and poor utilisation of evidence-based therapies worsen outcomes in resource-constrained places[6,7]. As a result, understanding the frequency and clinical features of ACS is critical for developing effective prevention and care measures in these settings. Bangladesh has seen a marked increase in cardiovascular diseases, driven by socioeconomic transitions and evolving health behaviors[8,9]. However, there is a scarcity of reliable epidemiological data on ACS prevalence in tertiary care facilities. Studies show that early intervention in ACS, including quick detection and care of STEMI and NSTEMI, dramatically decreases mortality and improves patient outcomes[10].

The purpose of this study is to investigate the prevalence of ACS among patients who present with chest pain at Eastern Medical College and Hospital in Cumilla, Bangladesh. This study aims to improve understanding of the region's ACS burden by investigating the distribution of ACS subtypes and related risk factors.

OBJECTIVES

General Objective:

The purpose of this study was to investigate the prevalence of acute coronary syndrome (ACS) among patients who presented with chest discomfort at a tertiary care cardiac centre in Bangladesh.

Specific Objectives:

- The study aimed to determine how many individuals with chest pain had unstable angina, non-ST-elevation myocardial infarction (NSTEMI), or ST-elevation myocardial infarction (STEMI).
- To assess the demographics and clinical features of patients with ACS.
- The study aims to evaluate the relationship between cardiovascular risk factors (e.g., hypertension, diabetes, dyslipidaemia, smoking) and the occurrence of ACS.
- Analyse in-hospital outcomes of patients with ACS, including death and morbidity.
- To compare the diagnostic and management strategies utilized in patients presenting with chest pain with or without ACS.

METHODS AND MATERIALS

Study Design: This was a cross-sectional observational study conducted over one year, from July 2023 to June 2024. The study focused on determining the prevalence of acute coronary syndrome (ACS) among patients presenting with chest pain at the Department of Cardiology, Eastern Medical College and Hospital, Cumilla, Bangladesh.

Sample Calculation Formula: The required sample size was calculated using the following formula:

$$n = \frac{Z^2 \cdot p \cdot (1 - p)}{d^2}$$

Where:
n: Sample size
Z: Z-value at 95% confidence interval (1.96)
p: Expected prevalence of ACS in chest pain patients (assumed 0.50 for maximum variability)
d: Margin of error (0.05)
Using this formula, a sample size of 384 was initially calculated. However, based on feasibility, 300 patients were recruited for the study.

Inclusion Criteria:

- Patients aged 18 years and above presenting with chest pain.
- Individuals diagnosed with ACS based on clinical presentation, electrocardiographic changes, and cardiac biomarkers.
- Patients willing to provide informed consent.

Exclusion Criteria:

- Patients with chest pain due to non-cardiac causes (e.g., musculoskeletal or gastroin testinal).
- Individuals with a previous history of ACS but presenting with unrelated symptoms.
- Critically ill patients unable to provide consent.

Study Procedure: Patients who presented with chest pain to Eastern Medical College and Hospital's emergency department or outpatient clinics underwent a standardised clinical evaluation. Following informed consent, a complete history and physical examination were performed, followed by any necessary investigations, such as electrocardiograms (ECGs) and cardiac biomarker testing. Patients identified with acute coronary syndrome (ACS) based on clinical and diagnostic criteria were divided into three groups: STEMI,

NSTEMI, and unstable angina. Relevant data, such as demographic information, risk factors, clinical presentation, and in-hospital outcomes, were collected systematically using a predesigned form. To maintain the study's validity and reliability, the study included only eligible participants and followed predetermined inclusion and exclusion criteria.

Statistical Analysis: Data were analysed with the Statistical Package for the Social Sciences (SPSS) version 26.0. Continuous variables were provided as mean $\pm$ SD, and categorical variables were summarised as frequencies and percentages. Chi-square tests were used to compare proportions, whereas independent t-tests or ANOVA were used to analyse continuous variables. A p-value of <0.05 indicated statistical significance.

Ethical Consideration: Before beginning this investigation, the Eastern Medical College and Hospital Institutional Review Board (IRB) provided ethical permission. All participants provided written informed permission after being explained the study's objectives, procedures, and potential benefits. Participants were promised of secrecy, and the freedom to resign from the study at any time without penalty was emphasised. The study followed the ethical standards established in the Declaration of Helsinki, including respect for participant autonomy, beneficence, and nonmaleficence throughout the research process.

RESULTS

Table 1: Demographic Characteristics of the Study Population

Variable	Frequency (n=300)	Percentage (%)
Age Group (years)		
<40	60	20.0
40–59	150	50.0
≥60	90	30.0
Gender		
Male	210	70.0
Female	90	30.0

Table 1 shows the study population of 300 patients revealed that 50% were in the 40–59 years age group, 30% were aged 60 years or older, and 20% were under 40 years. Regarding gender distribution, 70% of the patients were male and 30% were female.
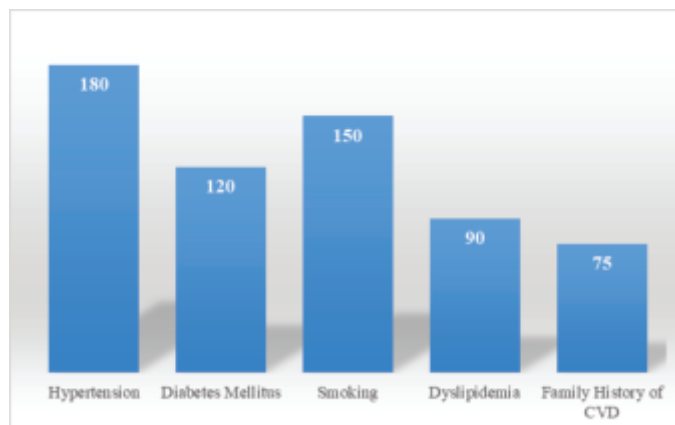

Figure 1: Risk Factors for ACS

Figure 1 shows the study identified common risk factors for acute coronary syndrome (ACS), with hypertension (60%), smoking (50%), and diabetes mellitus (40%) being the most prevalent. Other notable risk factors included dyslipidemia (30%) and a family history of cardiovascular disease (25%), all of which are well-established contributors to ACS development.

Table 2: Types of ACS Diagnosed

Type of ACS	Frequency (n=300)	Percentage (%)
STEMI	135	45.0
NSTEMI	105	35.0
Unstable Angina	60	20.0

Table 2 shows that STEMI was the most common type of ACS (45%), followed by NSTEMI (35%), and unstable angina (20%). This distribution aligns with the typical incidence of these conditions, with STEMI requiring more urgent intervention due to the extent of myocardial damage.
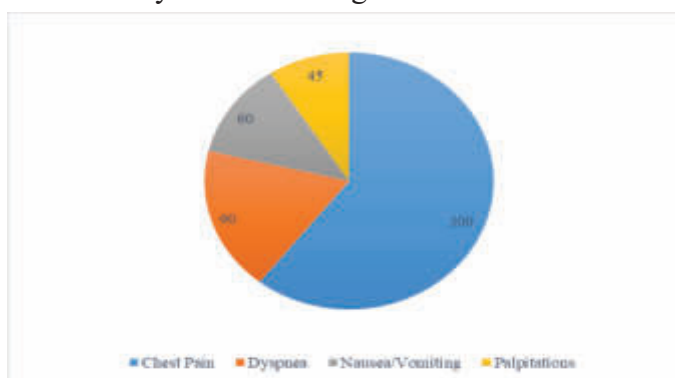

Figure 2: Clinical Presentations of ACS

Figure 2 presents all patients (100%) presented with chest pain, while dyspnea was reported by 30%, nausea/vomiting by 20%, and palpitations by 15%. These symptoms are commonly associated with ACS, with chest pain being the primary indicator for most patients.

Table 3: Time to Hospital Presentation

Time Interval	Frequency (n=300)	Percentage (%)
<6 Hours	90	30.0
6–12 Hours	120	40.0
>12 Hours	90	30.0

Table 3 shows the majority of patients presented within 6–12 hours (40%), with 30% presenting within 6 hours, and another 30% after 12 hours. The timing of presentation is critical, as early intervention can significantly impact patient outcomes**.**

Table 4: In-Hospital Management

Treatment	Frequency (n=300)	Percentage (%)
Thrombolysis	150	50.0
PCI	75	25.0
CABG	30	10.0
Medical Management	45	15.0

Table 4 shows Thrombolysis was administered to 50% of patients, followed by PCI in 25%, CABG in 10%, and medical management in 15%. These treatment strategies vary based on ACS subtype and severity, aiming to restore blood flow and prevent further damage.

Table 5: Short-Term Outcomes

Outcome	Frequency (n=300)	Percentage (%)
Discharged	270	90.0
In-Hospital Mortality	30	10.0

A majority of patients (90%) were discharged after treatment, while 10% experienced in-hospital mortality, highlighting the severity of ACS and the importance of early diagnosis and intervention.

Table 6: Risk Factor Associations with ACS Subtypes

Risk Factor	STEMI (%)	NSTEMI (%)	Unstable Angina (%)
Smoking	60	40	20
Hypertension	50	60	70

Smoking was most common in STEMI patients (60%), while hypertension was more frequent in unstable angina (70%) and NSTEMI (60%). These risk factors reflect the underlying pathophysiology of each ACS subtype, emphasizing the need for targeted prevention and management strategies.

DISCUSSION

The study looked at the prevalence of acute coronary syndrome (ACS) among patients with chest pain at Eastern Medical College and Hospital in Cumilla, Bangladesh, and found information on patient demographics, risk factors, ACS subtypes, clinical presentations, management strategies, and short-term outcomes. The findings revealed that the majority of the patients were between the ages of 40 and 59 (50%), with a high male predominance (70%). This is consistent with global trends, in which ACS is more common in older guys, particularly those aged 40 to 60 years, due to the cumulative burden of risk factors such as hypertension, smoking, and diabetes.[11,12]. The high prevalence of hypertension (60%) and smoking (50%) in this sample is consistent with other research that emphasise these as significant modifiable risk factors for ACS.[13,14]. Smoking, in particular, plays a significant role in accelerating atherosclerosis, which increases the risk of myocardial infarction, particularly STEMI[15]. In this study, STEMI (45%) was the most common ACS subtype, followed by NSTEMI (35%) and unstable angina (20%). This distribution is consistent with regional studies, where STEMI typically dominates in the ACS spectrum, especially in countries with high rates of smoking and diabetes, which are strong risk factors for STEMI [16,17]. The relatively high proportion of NSTEMI cases reflects the evolving profile of ACS, where the threshold for diagnosis and treatment is widening, and NSTEMI is increasingly recognized due to improved diagnostic tools[18]. All patients presented with chest pain, which is consistent with the literature, as chest pain remains the hallmark symptom of ACS[19]. The presence of dyspnea in 30% of cases further underscores the severity of myocardial ischemia and the potential for heart failure, a common complication in ACS patients[20]. Other symptoms, such as nausea/vomiting (20%) and palpitations (15%), were less prevalent but still notable, as they are frequently associated with the sympathetic response to severe cardiac events, especially in STEMI patients[21]. The majority of patients presented to the hospital within 6–12 hours (40%) of symptom onset, which is a critical time window for initiating effective interventions such as thrombolysis or PCI. Studies have shown that early presentation and prompt treatment significantly

reduce mortality and improve outcomes in ACS patients[22,23]. Delayed hospital presentation, as seen in 30% of patients who presented after 12 hours, is concerning, as the benefit of reperfusion therapy diminishes with time, leading to poorer short-term outcomes[24]. In-hospital management varied, with thrombolysis administered to 50% of the patients, consistent with its use in STEMI cases, particularly when PCI is unavailable[25]. Percutaneous coronary intervention (PCI) was performed in 25% of cases, emphasizing its role as the preferred reperfusion therapy when facilities allow[26]. Coronary artery bypass grafting (CABG) was performed in 10% of patients, reflecting the need for surgical intervention in those with multivessel disease, a scenario increasingly seen in older patients with long-standing risk factors such as diabetes and hypertension[27]. The study found a 90% discharge rate, which is a positive outcome, particularly given the high proportion of STEMI and NSTEMI cases. However, the 10% in-hospital mortality rate is a reminder of the severity of ACS and the importance of timely intervention. Previous studies have reported similar mortality rates, with mortality being higher in STEMI patients, particularly those who present late or have multiple comorbidities such as diabetes and hypertension [28,29]. The association between smoking and STEMI (60%) and the strong link between hypertension and unstable angina (70%) highlight the role of these modifiable risk factors in the pathogenesis of ACS. Smoking accelerates atherosclerotic plaque rupture, which is more common in STEMI patients, while hypertension leads to endothelial damage, which contributes to the development of unstable angina [30,31].

Limitation: The study has significant drawbacks. The data were collected from a single tertiary care centre, so the conclusions may not be applicable to other regions or populations. Furthermore, the study was cross-sectional, which means it did not show a causal relationship between risk variables and ACS subtypes. Additional longitudinal studies across different centres are required to validate these findings and explore the long-term outcomes of ACS patients in Bangladesh.

CONCLUSION
This investigation of the frequency of acute coronary syndrome (ACS) among patients with chest pain at Eastern Medical College and Hospital in Cumilla, Bangladesh, reveals important data about patient demographics, risk factors, and clinical outcomes.

The findings show a high prevalence of ACS, particularly among middle-aged and older patients, with a clear male predominance. The key risk factors, such as hypertension, diabetes, and smoking, are consistent with global trends. STEMI was the most prevalent ACS subtype, and early intervention measures including thrombolysis and PCI were critical to better patient outcomes. These findings highlight the importance of targeted prevention and early intervention programs, with a particular focus on modifiable risk factors like smoking and hypertension, which are common in this group.

Recommendation: It is advised that preventive efforts be improved, with a special emphasis on smoking cessation, good hypertension and diabetes management, and early identification of ACS. To lower the prevalence of ACS, public health campaigns and clinical practices should focus on lifestyle changes and routine cardiovascular screening. Furthermore, raising knowledge of the early symptoms of ACS may increase quick presentation to healthcare institutions, ultimately improving outcomes.

Conflict of Interest: The authors disclose no conflicts of interest in the publishing of this paper. No financial or personal affiliations might impact the results or interpretation of the data.

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