Associated Risk Factors and Clinical Outcomes of Acute Coronary Syndrome Patients in A Tertiary Care Hospital

Monish Saha Roy¹*, MD. Rokun Uddin², Haripada Roy³, Goutam Chandra Bhowmik⁴, Rita Das⁵, Purna Jiban Chakma⁶, Mirza Nurul Karim⁷

*¹Junior Consultant (Medicine), Fatikchari Upazilla Health Complex, Chattogram, Bangladesh.
Email: drmonishsaharoy@gmail.com
Orcid ID: 0009-0008-0253-1741

²Junior Consultant (Cardiology), Mirsharai Upazilla Health Complex, Chattogram, Bangladesh.
Email: m.rokun19@gmail.com
Orcid ID: 0000-0002-5770-6384

³Junior Consultant (Cardiology), Kotalipara Upazilla Health Complex, Gopalgonj, Bangladesh, Email: dr.royhp@gmail.com, Orcid Id: 0009-0004-4712-2993

⁴Assistant Registrar, Department of Cardiology, National Institute of Cardiovascular Diseases, Dhaka, Bangladesh, dr.goutom@gmail.com
Orcid ID: 0009-0000-6037-8281

⁵Junior Consultant (Pediatrics), Rangunia Upazilla Health Complex, Chattogram, Bangladesh.
Email: drritasomc36@gmail.com
Orcid ID: 0009-0000-7944-2589

⁶Junior Consultant (Cardiology), Adhunik Zilla Sadar Hospital, Khagrachaari, Bangladesh.
Email: purnajchakma@gmail.com
Orcid ID: 0009-0001-0045-1835

⁷Assistant Professor, Department of Medicine, Chttogram Medical College, Chattogram, Bangladesh.
Email: mirzanurulkarim@gmail.com
Orcid ID: 0000-0002-7010-9525

*Corresponding author

Abstract

Background: Acute coronary syndrome (ACS) is a significant cause of morbidity and mortality worldwide. Identifying the risk factors, clinical outcomes, and complications of ACS patients is crucial for optimal patient management and resource allocation. This study aimed to investigate these factors in a tertiary care hospital in Bangladesh. **Material & Methods:** This cross-sectional observational study was conducted with a sample of 100 ACS patients at the Department of Cardiology, Cumilla Medical College Hospital, Cumilla, Bangladesh. The study duration was 6 months, from March 2013 to August 2013. Data were collected on socio-demographic characteristics, physical measurements, risk factors, presenting symptoms, ACS types, and outcome complications. Descriptive statistics were used to analyze the data. **Results:** The study population comprised 76% males and 24% females, with a mean age of 55.4 years. The most prevalent risk factors were smoking (59%), hypertension (41%), and diabetes mellitus (10%). Chest pain was the most common presenting symptom (86%). STEMI (48%), unstable angina (44%), and NSTEMI (8%) were the identified ACS types. Complications observed included heart failure (9%), cardiogenic shock (8%), conduction defects (10%), and arrhythmias (13%), with no reported deaths. **Conclusion:** Our findings emphasize the importance of addressing modifiable risk factors such as smoking, hypertension, and diabetes mellitus through targeted interventions and public health initiatives. Additionally, the study highlights the need for healthcare providers to be aware of both typical and atypical presentations of ACS to facilitate prompt diagnosis and treatment. Further research with larger, multicenter studies is needed to better understand the complexities of ACS risk factors and outcomes in Bangladesh and other low- and middle-income countries.

INTRODUCTION

Acute Coronary Syndrome (ACS) encompasses a range of clinical conditions characterized by acute myocardial ischemia, which includes unstable angina, non-ST-elevation myocardial infarction (NSTEMI), and ST-elevation myocardial infarction (STEMI).[1] ACS is a

177

significant cause of morbidity and mortality worldwide, posing a major public health concern. According to the World Health Organization, cardiovascular diseases (CVDs) are the leading cause of death globally, accounting for nearly 17.9 million deaths annually, with ACS contributing to a substantial portion of these fatalities.[2] In Asia, the burden of CVDs is rising rapidly due to population growth, aging, and lifestyle changes, with an estimated 9.7 million deaths attributable to CVDs in 2019 alone.[3] Bangladesh, a densely populated South Asian country, is experiencing an epidemiological transition characterized by a growing burden of non-communicable diseases (NCDs), including CVDs. Recent studies estimate that CVDs are responsible for 27% of total deaths in Bangladesh, with ACS contributing significantly to this figure.[4] The growing prevalence of ACS in Bangladesh is attributed to an increase in traditional risk factors, such as hypertension, diabetes, dyslipidemia, smoking, and obesity, as well as emerging risk factors like urbanization, sedentary lifestyles, and unhealthy dietary habits.[5] Early recognition of ACS symptoms is crucial for prompt and effective management. Typical symptoms include chest pain, shortness of breath, nausea, vomiting, and diaphoresis; however, atypical presentations are more common in certain populations, such as women, older adults, and individuals with diabetes.[6] Delayed diagnosis and treatment of ACS can lead to serious complications, such as heart failure, arrhythmias, and cardiogenic shock, further impacting patients' quality of life and long-term prognosis.[7] Management of ACS relies on a combination of pharmacological and invasive interventions, including antithrombotic therapy, beta-blockers, angiotensin-converting enzyme inhibitors, and revascularization procedures like percutaneous coronary intervention (PCI) and coronary artery bypass grafting (CABG).[8] However, access to advanced healthcare services and adherence to evidence-based guidelines remain significant challenges in low- and middle-income countries like Bangladesh, where healthcare resources are limited and the healthcare infrastructure is often inadequate.[9] To address the knowledge gap on the associated risk factors and clinical outcomes of ACS patients in Bangladesh, we conducted an observational study in a tertiary care hospital in the country. This study aims to identify the prevalence of traditional and emerging risk factors among ACS patients, evaluate the management strategies employed, and assess the impact of these factors on clinical outcomes. By doing so, we hope to provide valuable insights that could inform the development of targeted interventions and strategies to improve ACS management and prognosis in the Bangladeshi population.

MATERIAL AND METHODS

This observational cross-sectional study was conducted at the Department of Cardiology, Cumilla Medical College Hospital, Cumilla, Bangladesh. The study duration was 6 months, from March 2013 to August 2013. During this period, a total of 100 patients with acute coronary syndrome presented at the study department were included in the study. Purposive sampling technique was used to collect the participants for the study. Any patients presenting with ACS related clinical features, evidenced by ischemic electrocardiographic changes or raised myocardial biomarkers were included in the

study after their informed consent was taken. Any patients presenting with chest pain for over 12 hours, patients with severe renal or hepatic impairment, patients with sepsis, hemoglobinopathy and hypothyroidism, and patients unwilling to give consent for their participation were excluded from the study. Data was collected using a structured questionnaire after ensuring anonymity of the participants, and informed consent was obtained from each participant prior to data collection. Ethical approval was also obtained regarding this study from the ethical review committee of the study hospital. All data were recorded systemically and quantitative data were expressed as mean and standard deviation and qualitative data as frequency distribution and percentage. Collected data were compiled in tables and diagrams.

RESULTS

[Table 1] presents the socio-demographic characteristics of the 100 participants included in the study. The age distribution of the participants was as follows: 1% (n=1) were aged between 20-29 years, 8% (n=8) between 30-39 years, 19% (n=19) between 40-49 years, 35% (n=35) between 50-59 years, 23% (n=23) between 60-69 years, 10% (n=10) between 70-79 years, and 4% (n=4) were aged 80 years or older. The majority of the participants were male (76%, n=76), while 24% (n=24) were female. In terms of residence, 72% (n=72) of the participants resided in rural areas, and 28% (n=28) in urban areas. Regarding occupation, 23% (n=23) of the participants were cultivators, 21% (n=21) were housewives, 15% (n=15) were service holders, 21% (n=21) were businessmen, 5% (n=5) were day laborers, 6% (n=6) were

teachers, and 9% (n=9) reported other occupations.

[Table 2] presents the distribution of participants by physical measurements. Among the 100 participants, height was classified into three categories: 16% (n=16) were shorter than 155 cm, 66% (n=66) were between 155 cm and 169 cm, and 18% (n=18) were taller than 169 cm. Weight was also divided into four categories: 24% (n=24) of the participants weighed less than 55 kg, 43% (n=43) weighed between 55 kg and 64 kg, 22% (n=22) weighed between 65 kg and 74 kg, and 11% (n=11) weighed more than 75 kg. Body mass index (BMI) was calculated for each participant and categorized as follows: 62% (n=62) had a BMI of less than 24.9 kg/m², falling within the normal weight range; 32% (n=32) had a BMI between 25 and 29.9 kg/m², classified as overweight; and 6% (n=6) had a BMI greater than 30 kg/m², indicating obesity.

[Table 3] illustrates the distribution of risk factors among the 100 participants in the study population. The most prevalent risk factor was smoking, with 59% (n=59) of participants reporting a history of smoking. Use of smokeless tobacco products, such as Sada Jarda and gul, was reported by 18% (n=18) of the participants. Hypertension was present in 41% (n=41) of the study population, making it another significant risk factor. Diabetes Mellitus was reported in 10% (n=10) of the participants, while hypercholesterolemia was found in 12% (n=12). A family history of cardiovascular disease was reported by 7% (n=7) of the participants, and alcohol consumption was reported by 5% (n=5). A previous history of coronary artery disease (CAD) was reported by 8% (n=8) of the participants.

[Table 4] displays the presenting symptoms of acute coronary syndrome (ACS) in the study population of 100 participants. The most common presenting symptom was chest pain, reported by 86% (n=86) of the participants. Acute dyspnea, or shortness of breath, was experienced by 6% (n=6) of the participants. Epigastric pain was reported by 3% (n=3) of the participants, while collapse or syncope was experienced by 2% (n=2). Palpitation was a presenting symptom for 1% (n=1) of the participants. Other presentations, not specified in the table, were reported by 2% (n=2) of the participants.
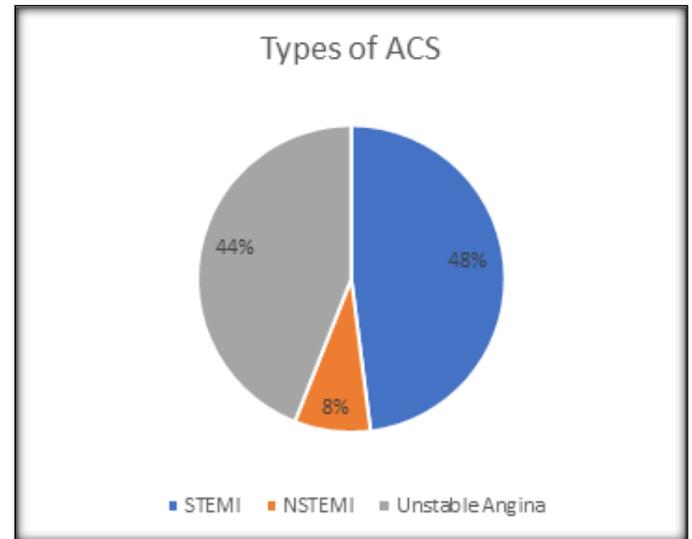

Figure 1: Distribution of participants by ACS associated symptoms (N=100)

[Figure 1] demonstrates the distribution of participants by ACS-associated symptoms among the 100 participants. Breathlessness was reported by 27% (n=27) of the participants, while nausea and vomiting were experienced by 46% (n=46). Sweating and pallor were reported by 40% (n=40) of the participants. Vertigo and weakness were the least common associated symptoms, reported by only 3% (n=3) of the participants.

Figure 2: Distribution of participants by types of ACS (N=100)

[Figure 2] displays the distribution of participants by types of acute coronary syndrome (ACS) among the 100 participants. The most common type of ACS in the study population was ST-elevation myocardial infarction (STEMI), which was observed in 48% (n=48) of the participants. Non-ST-elevation myocardial infarction (NSTEMI) was found in 8% (n=8) of the participants. Unstable angina, another type of ACS, was reported by 44% (n=44) of the participants.
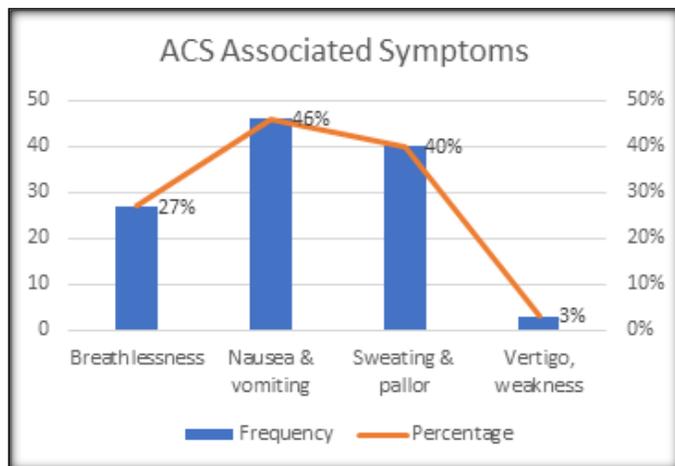
[Table 5] presents the distribution of participants by outcome complications among the 100 participants. Heart failure was observed in 9% (n=9) of the participants, while cardiogenic shock, a life-threatening condition resulting from inadequate blood flow due to the failing heart, was reported by 8% (n=8) of the participants. Conduction defects, abnormalities in the electrical conduction system of the heart, were observed in 10% (n=10) of the participants. Arrhythmias, irregular heart rhythms, were

experienced by 13% (n=13) of the participants, with 2% (n=2) of those experiencing premature ventricular contractions (PVCs), a specific type of arrhythmia. Notably, no deaths were reported in this study population.

Table 1: Socio-Demographic distribution of the participants (N=100)

Variables	Frequency	Percentage
Age		
20-29	1	1%
30-39	8	8%
40-49	19	19%
50-59	35	35%
60-69	23	23%
70-79	10	10%
>80	4	4%
Gender		
Male	76	76%
Female	24	24%
Residence		
Rural	72	72%
Urban	28	28%
Occupation		
Cultivator	23	23%
House Wife	21	21%
Service holder	15	15%
Businessman	21	21%
Day laborer	5	5%
Teacher	6	6%
Others	9	9%

Table 2: Distribution of participants by physical measurements (N=100)

Variables	Frequency	Percentage
Height (cm)		
<155	16	16%
155-169	66	66%
>169	18	18%
Weight (kg)		
<55	24	24%
55-64	43	43%
65-74	22	22%
>75	11	11%
BMI (kg/m2)		

<24.9	62	62%
25-29.9	32	32%
>30 (obese)	6	6%

Table 3: Distribution of risk factors in study population (N=100)

Risk factors	Frequency	Percentage
Smoking	59	59%
Sada Jarda, gul	18	18%
Hypertension	41	41%
Diabetes Mellitus	10	10%
Hypercholesterolemia	12	12%
Family history	7	7%
Alcohol	5	5%
Previous H/O CAD	8	8%

Table 4: Presenting symptoms in ACS in study population (N=100).

Symptoms	Frequency	Percentage
Chest pain	86	86%
Acute dyspnea	6	6%
Epigastric pain	3	3%
Collapse/syncope	2	2%
Palpitation	1	1%
Other presentation	2	2%

Table 5: Distribution of participants by outcome complications (N=100)

Complications	Frequency	Percentage
Heart failure	9	9%
Cardiogenic shock	8	8%
Conduction defects	10	10%
Arrhythmia	13	13%
PVC	2	2%
Death	0	0%

DISCUSSION

In this observational study, we investigated the associated risk factors, clinical outcomes, and complications of acute coronary syndrome (ACS) patients in a tertiary care hospital in Bangladesh. Our findings are discussed in detail below, with comparisons to similar studies where appropriate. Our study revealed a male predominance (76%) in the population, which aligns with previous studies that reported a higher incidence of ACS among men.[1] This gender difference has been attributed to factors such as hormonal differences, which provide women with some level of cardioprotection until menopause, and

lifestyle factors such as smoking, which is more prevalent among men.[2]) The socio-demographic distribution of our study population, including age, residence, and occupation, reflects the diverse nature of ACS patients in Bangladesh, which may have implications for the development of targeted interventions and healthcare resource allocation. The distribution of participants by physical measurements, including height, weight, and body mass index (BMI), displayed a relatively high prevalence of overweight (32%) and obesity (6%), which are known risk factors for ACS.[3] These findings are consistent with global trends indicating increasing rates of overweight and obesity, which have been linked to changes in dietary patterns and sedentary lifestyles.[4] Our results highlight the importance of addressing these modifiable risk factors through lifestyle interventions and public health initiatives aimed at promoting healthy weight management. The distribution of risk factors among the study population, with smoking (59%), hypertension (41%), and diabetes mellitus (10%) being the most prevalent. Similar studies conducted in Bangladesh and other countries have also identified these risk factors as significant contributors to ACS.[5,6] The high prevalence of smoking in our study population highlights the urgent need for targeted smoking cessation interventions. Hypertension and diabetes mellitus are both modifiable risk factors that can be managed through lifestyle changes and medication, indicating the importance of early detection and management of these conditions to reduce the incidence of ACS. The presenting symptoms of ACS in our study population include chest pain as the most common symptom (86%), which is consistent with

previous research.[7] However, we also observed a substantial proportion of patients presenting with atypical symptoms such as acute dyspnea (6%) and epigastric pain (3%). These findings underscore the importance of being aware of the full range of ACS presentations to facilitate prompt diagnosis and management. Our study findings align with prior research indicating that atypical presentations are more common in certain subgroups, such as older adults, women, and individuals with diabetes.[8] The distribution of participants by types of ACS reported STEMI (48%) as the most common, followed by unstable angina (44%) and NSTEMI (8%). This distribution is similar to findings from some studies,[9] while others have reported a higher prevalence of NSTEMI compared to STEMI.[9,10] This discrepancy could be attributed to differences in study populations, healthcare settings, and diagnostic criteria. It is also possible that advances in diagnostic techniques and changes in management strategies have contributed to the observed variation in the distribution of ACS types over time.

The distribution of participants by outcome complications included heart failure (9%), cardiogenic shock (8%), conduction defects (10%), and arrhythmias (13%), with no reported deaths. The incidence of complications in our study was relatively low compared to other studies.[11] This could be due to several factors, including differences in study populations, the quality of care provided at the tertiary care hospital, and the specific interventions implemented during the study period. The absence of reported deaths may also be attributed to the relatively small sample size and the short duration of the study. In

conclusion, our study findings were largely consistent with those of previous research on ACS risk factors, presentations, and outcomes. The observed discrepancies between our study and others could be attributed to differences in study populations, healthcare settings, and methodological factors. The high prevalence of modifiable risk factors in our study population, such as smoking, hypertension, and diabetes mellitus, highlights the need for targeted interventions to address these factors and reduce the incidence of ACS. Additionally, our findings underscore the importance of considering both typical and atypical ACS presentations to facilitate prompt diagnosis and management, which may ultimately improve patient outcomes. It is essential to recognize that our study was conducted in a single tertiary care hospital in Bangladesh, which may limit the generalizability of our findings. However, the results can provide valuable insights for healthcare providers and policymakers in the region. Future research should aim to include larger sample sizes and diverse healthcare settings to further explore the risk factors, clinical presentations, and outcomes of ACS patients in Bangladesh and other low- and middle-income countries. Such studies can help inform the development of targeted public health initiatives and inform clinical practice guidelines, ultimately contributing to improved patient care and outcomes for those affected by ACS.

Limitations of the study

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

CONCLUSIONS

In conclusion, our study findings were largely consistent with those of previous research on ACS risk factors, presentations, and outcomes. The observed discrepancies between our study and others could be attributed to differences in study populations, healthcare settings, and methodological factors. The high prevalence of modifiable risk factors in our study population, such as smoking, hypertension, and diabetes mellitus, highlights the need for targeted interventions to address these factors and reduce the incidence of ACS. Additionally, our findings underscore the importance of considering both typical and atypical ACS presentations to facilitate prompt diagnosis and management, which may ultimately improve patient outcomes.

REFERENCES

1. Amsterdam EA, Wenger NK, Brindis RG, Casey DE Jr, Ganiats TG, Holmes DR et al. 2014 AHA/ACC guideline for the management of patients with non-ST-elevation acute coronary syndromes: executive summary: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. Circulation. 2014;130(25):2354-94. doi: 10.1161/CIR.0000000000000133.
2. Bush M, Evenson KR, Aylward A, Cyr JM, Kucharska-Newton A. Psychosocial services provided by licensed cardiac rehabilitation programs. Front Rehabil Sci. 2023;4:1093086. doi: 10.3389/fresc.2023.1093086.
3. Roth GA, Mensah GA, Johnson CO, Addolorato G, Ammirati E, Baddour LM, et al. Global Burden of Cardiovascular Diseases and Risk Factors, 1990–2019: Update From the GBD 2019 Study. J Am Coll Cardiol. 2020;76(25):2982–3021.
4. Islam AM, Mohibullah AKM, Paul T. Cardiovascular Disease in Bangladesh: A Review. Bangladesh Heart J. 2016;31(2):80–99.
5. Islam SMS, Purnat TD, Phuong NTA, Mwingira U, Schacht K, Fröschl G. Non-communicable diseases

(NCDs) in developing countries: a symposium report. Glob Health. 2014;10:81.

6. Canto JG, Rogers WJ, Goldberg RJ, Peterson ED, Wenger NK, Vaccarino V, et al. Association of Age and Sex With Myocardial Infarction Symptom Presentation and In-Hospital Mortality. JAMA. 2012;307(8):813–22.

7. Sanchis-Gomar F, Perez-Quilis C, Leischik R, Lucia A. Epidemiology of coronary heart disease and acute coronary syndrome. Ann Transl Med. 2016;4(13):256.

8. Ibanez B, James S, Agewall S, Antunes MJ, Bucciarelli-Ducci C, Bueno H, et al. 2017 ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation: The Task Force for the management of acute myocardial infarction in patients presenting with ST-segment elevation of the European Society of Cardiology (ESC). Eur Heart J. 2018;39(2):119–77.

9. Chowdhury MZI, Anik AM, Farhana Z, Bristi PD, Abu Al Mamun BM, Uddin MJ, et al. Prevalence of metabolic syndrome in Bangladesh: a systematic review and meta-analysis of the studies. BMC Public Health. 2018;18(1):308.

10. Kumar A, Cannon CP. Acute Coronary Syndromes: Diagnosis and Management, Part I. Mayo Clin Proc. 2009;84(10):917.

11. Fox KAA, Steg PG, Eagle KA, Goodman SG, Anderson FA, Granger CB, et al. Decline in rates of death and heart failure in acute coronary syndromes, 1999-2006. JAMA. 2007;297(17):1892–900.