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Impact Of ECG Findings Along With Comorbidity Characteristics Among ACS Patients At A Tertiary Level Hospital In Bangladesh

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Abstract

Background: *Acute Coronary Syndrome (ACS) remains a leading cause of morbidity and mortality globally, with a significant burden in low and middle-income countries like Bangladesh. This study aims to elucidate the clinical characteristics, ECG findings, and comorbidity profiles of ACS patients at a tertiary level hospital in Bangladesh, providing insights into demographic distribution, risk factors, and electrocardiographic patterns.*

Methods: *This cross-sectional study was conducted over a period of one year, encompassing 42 patients diagnosed with ACS. Data were collected on demographic characteristics, presenting symptoms, risk factors, comorbidities, and ECG findings. Inclusion criteria were adults aged 18 and above with a confirmed diagnosis of ACS. Exclusion criteria included patients with incomplete medical records and those who declined to participate.*

Result: *The majority of the patients were male (90.48%), with a higher incidence observed in the middle-aged population (59.52% between 41-60 years). Smoking emerged as the most prevalent risk factor (78.57%). ECG findings indicated a predominance of anterior lead involvement (54.76%). The distribution of ACS types was balanced, with 35.71% STEMI, 38.10% NSTEMI, and 26.19% unstable angina.*

Conclusion: *The study highlights a significant male predominance and middle-aged demographic as the most affected by ACS. Smoking remains a critical modifiable risk factor. Anterior lead involvement was the most common ECG finding, suggesting a potential anatomical predilection. These findings underscore the need for targeted interventions, especially smoking cessation programs, and tailored diagnostic and therapeutic strategies for ACS in Bangladesh.*

Keywords: *Echocardiogram, Acute Coronary Syndrome, Stable Angina, Unstable Angina, Cardiovascular*

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I. INTRODUCTION

Acute Coronary Syndrome (ACS) represents a spectrum of clinical presentations ranging from unstable angina to myocardial infarction, which are associated with substantial morbidity and mortality worldwide. Globally, ACS is a leading cause of death, with millions of individuals affected annually. The World Health Organization estimates that cardiovascular diseases (CVDs), including ACS, are the number one cause of death globally, taking an estimated 17.9 million lives each year, which accounts for 31% of all global deaths (1). Among these, approximately 7.4 million are due to coronary heart disease, of which ACS is a significant component (2). The burden of ACS is particularly pronounced in low and middle-income countries, where rapid urbanization, lifestyle changes, and limited healthcare infrastructure contribute to rising incidence rates. In these regions, over three-quarters of CVD deaths occur, highlighting the disproportionate impact on less affluent populations (3).In Bangladesh, a densely populated South Asian nation, the prevalence of cardiovascular

diseases, including ACS, has surged in recent years. A study conducted in a tertiary care hospital in Dhaka reported that ACS accounted for 40% of all cardiovascular admissions, underscoring the significant burden of this condition in the country (4). Factors such as hypertension, diabetes, smoking, and dyslipidemia, which are prevalent in the country, have been identified as significant contributors to the risk of ACS. The Bangladesh Demographic and Health Survey reported that nearly one in four adults in Bangladesh has hypertension, and the prevalence of diabetes is around 10%, both of which are major risk factors for ACS (5). Additionally, the healthcare system in Bangladesh, especially at the tertiary level, faces challenges in the timely diagnosis and management of ACS, further exacerbating the morbidity associated with the condition. A study on the healthcare delivery for ACS patients in Bangladesh highlighted that only 22% of patients received thrombolytic therapy within the recommended time frame, indicating significant delays in treatment (6).Electrocardiogram (ECG) is a fundamental diagnostic tool in the evaluation of patients presenting with suspected ACS. Specific ECG changes, such as ST-segment elevations, T-wave inversions, and Q-wave formations, provide crucial insights into the location, extent, and severity of myocardial ischemia (7). Moreover, ECG findings can guide therapeutic decisions, from medical management to invasive interventions like coronary angiography and percutaneous coronary intervention (8).

However, the relationship between ECG findings and the overall prognosis of ACS patients, especially in the context of comorbidities, remains an area of active research. Comorbidities, such as diabetes, renal dysfunction, and prior cardiovascular events, can influence the presentation and outcomes of ACS (9). Understanding the interplay between ECG findings and these comorbidities can offer valuable insights into patient stratification, risk assessment, and tailored management strategies.In the Bangladeshi context, where resources are limited and the burden of ACS is high, such insights are of paramount importance. A comprehensive evaluation of ECG findings in conjunction with comorbidity characteristics among ACS patients can aid clinicians in making informed decisions, optimizing resource allocation, and improving patient outcomes. This study aims to bridge the existing knowledge gap, offering a localized perspective on a global health challenge and paving the way for evidence-based interventions in Bangladesh.The present study seeks to understand the impact of ECG findings along with comorbidity characteristics among ACS patients at a tertiary level hospital in Bangladesh. By analyzing the relationship between ECG patterns and comorbid conditions, this research aims to enhance the understanding of ACS in the Bangladeshi population, ultimately contributing to improved clinical outcomes and patient care.

II. METHODS

This cross-sectional study was conducted at the Department of Cardiology, Jashore Medical College, 250 Beded General Hospital, Jashore, Bangladesh, over a period of one year. During this time, 42 patients with Acute Coronary Syndrome (ACS) were included in the study based on specific inclusion and exclusion criteria. Inclusion criteria encompassed patients aged 18 years and above diagnosed with ACS, which includes ST-segment elevation myocardial infarction, non-ST-segment elevation myocardial infarction, and unstable angina, as determined by clinical presentation, ECG changes, and elevated cardiac biomarkers. Exclusion criteria were a history of prior coronary artery bypass grafting or percutaneous coronary intervention, significant conduction abnormalities on ECG such as left bundle branch block, and inability or unwillingness to provide informed consent. Data collection involved recording patients' demographic information, clinical presentation, ECG findings, and comorbidity characteristics using a structured questionnaire. ECG findings were categorized based on the presence of ST-segment elevation, ST-segment depression, T-wave inversion, and Q-wave formation, while comorbidities like hypertension, diabetes, dyslipidemia, and chronic kidney disease were documented based on medical history and diagnostic criteria. For statistical analysis, descriptive statistics summarized demographic and clinical characteristics, chi-square tests analyzed the relationship between categorical variables, and t-tests were used for continuous variables, with a p-value of less than 0.05 considered statistically significant. All analyses were performed using SPSS version 25.0 (IBM Corp., Armonk, NY, USA). Ethical considerations included approval from the Institutional Review Board of Jashore Medical College, Jashore, Bangladeshand adherence to the 1964 Helsinki declaration and its later amendments, with informed consent obtained from all participants.

III. RESULTS

Table 1: Distribution of participants by demographic characteristics (n=42)

Variable	Frequency	Percentage
Age		
≤40	5	11.90%
41-50	12	28.57%
51-60	13	30.95%

61-70	9	21.43%
>70	3	7.14%
Gender		
Male	38	90.48%
Female	4	9.52%
Religion		
Islam	36	85.71%
Hindu	6	14.29%

The demographic characteristics of the participants in this study are summarized in Table 1. A total of 42 patients diagnosed with Acute Coronary Syndrome (ACS) were included in the study. The age distribution of the participants revealed that the majority were between the ages of 41 and 60, with 12 participants (28.57%) in the 41-50 age group and 13 participants (30.95%) in the 51-60 age group. The study also included 9 participants (21.43%) aged between 61 and 70, 5 participants (11.90%) aged 40 or younger, and 3 participants (7.14%) aged over 70. Regarding gender, the study population was predominantly male, with 38 male participants (90.48%) and only 4 female participants (9.52%). This reflects a significant gender disparity in the sample. In terms of religious affiliation, the majority of participants were Muslim, accounting for 36 individuals (85.71%), while 6 participants (14.29%) identified as Hindu.

Table 2: Distribution of participants by presenting symptoms (n=42)

Symptoms	Frequency	Percentage
Chest pain	40	95.24%
Shortness of Breath	19	45.24%
Excessive Sweating	12	28.57%
Dizziness	3	7.14%
Nausea/ Vomiting	2	4.76%

Table 2 outlines the distribution of presenting symptoms among the 42 participants diagnosed with Acute Coronary Syndrome (ACS). The most common presenting symptom was chest pain, reported by 40 participants, accounting for a substantial 95.24% of the study population. Shortness of breath was the second most frequently reported symptom, experienced by 19 participants, representing 45.24% of the sample. Excessive sweating was noted in 12 participants, making up 28.57% of the cases. Less common symptoms included dizziness, reported by 3 participants (7.14%), and nausea or vomiting, experienced by 2 participants (4.76%).

Table 3: Distribution of participants by presenting risk factors and comorbidities (n=42)

Risk factors	Frequency	Percentage
Hypertension	13	30.95%
Diabetes	12	28.57%
Smoking	33	78.57%
Family history of heart disease	1	2.38%
History of heart attack	1	2.38%

Table 3 presents the distribution of risk factors and comorbidities among the 42 participants diagnosed with Acute Coronary Syndrome (ACS). Smoking emerged as the most prevalent risk factor, with 33 participants (78.57%) reporting a history of smoking. Hypertension and diabetes were also common, identified in 13 (30.95%) and 12 (28.57%) participants, respectively. A family history of heart disease and a personal history of a previous heart attack were less common, each reported by only 1 participant (2.38%).

Table 4: Distribution of participants by ECG findings (n=42)

Abnormalities observed from ECG leads	Frequency	Percentage
Inferior Leads(II, III,aVG)	9	21.43%
Anterior leads(V1-V6)	23	54.76%
Lateral leads(I, aVL, V5-V6)	10	23.81%

Table 4 details the distribution of electrocardiogram (ECG) findings among the 42 participants diagnosed with Acute Coronary Syndrome (ACS). The most frequently observed abnormalities were in the anterior leads (V1-V6), noted in 23 participants, which constitutes 54.76% of the study population. Abnormalities in the lateral leads (I, aVL, V5-V6) were identified in 10 participants, accounting for 23.81% of the cases. Inferior lead abnormalities (II, III, aVF) were present in 9 participants, representing 21.43% of the cohort.

Table 5: Distribution of participants by ECG interpretation

ECG Interpretation	Frequency	Percentage
ST-elevation myocardial infarction(STEMI)	15	35.71%
Non-ST elevation myocardial infarction(NSTEMI)	16	38.10%
Unstable angina	11	26.19%

Table 5 illustrates the distribution of participants based on the interpretation of their electrocardiogram (ECG) findings. Among the 42 participants diagnosed with Acute Coronary Syndrome (ACS), ST-elevation myocardial infarction (STEMI) was identified in 15 participants, representing 35.71% of the study population. Non-ST elevation myocardial infarction (NSTEMI) was diagnosed in 16 participants, accounting for 38.10% of the cases. Unstable angina was observed in 11 participants, constituting 26.19% of the cohort.

IV. DISCUSSION

This study delves into the intricate landscape of clinical characteristics, ECG findings, and comorbidity profiles of ACS patients at a tertiary level hospital in Bangladesh, unveiling a demographic distribution heavily skewed towards male patients (90.48%). This male predominance in ACS incidence is not an isolated phenomenon, as corroborated by multiple studies that observed a similar trend(10,11). The study also observed a higher incidence of ACS in the middle-aged population (59.52% between 41-60 years), which is consistent with the findings of other similar studies (12). Intriguingly, the conspicuously lower percentage of female participants (9.52%) in our study beckons a deeper inquiry into the potential under-diagnosis or underreporting of ACS in females, a concern that resonates with the findings of Terence et al. (13). This gender disparity in ACS diagnosis and reporting is a multifaceted issue, potentially rooted in socio-cultural biases, differences in symptom presentation, and healthcare access disparities, warranting a more nuanced approach to cardiovascular care in women.The alarmingly high prevalence of smoking (78.57%) among the study population stands as a stark public health concern. This finding is in alignment with multiple global studies, that pinpointed smoking as a pivotal modifiable risk factor for ACS (14–17). The stark contrast between the prevalence of smoking and other risk factors such as hypertension (30.95%) and diabetes (28.57%) underscores the imperative need for robust, culturally-tailored smoking cessation programs. The entrenched smoking habits within this population not only exacerbate the risk of ACS but also pose a significant barrier to the amelioration of cardiovascular health outcomes. The implementation of comprehensive smoking cessation initiatives, coupled with public health education campaigns, could potentially mitigate this risk factor and curtail the burgeoning incidence of ACS in Bangladesh.The electrocardiographic (ECG) findings from this study offer a compelling glimpse into the myocardial involvement patterns in patients with Acute Coronary Syndrome (ACS) at a tertiary level hospital in Bangladesh. A predominant involvement of the anterior leads (V1-V6) in more than half of the participants (54.76%) was observed, a finding that is not only statistically significant but also clinically relevant. This anterior lead predominance may suggest a higher incidence of left anterior descending (LAD) artery involvement, a hypothesis that finds support in the study by Mehwish et al., which reported a similar distribution of ECG abnormalities in ACS patients(18). The lateral (23.81%) and inferior (21.43%) lead involvements, though less frequent, are indicative of the diverse anatomical distribution of coronary artery disease in this population, warranting a comprehensive approach to ECG interpretation in the clinical setting.A further dissection of the ECG findings reveals a balanced distribution of ST-elevation myocardial infarction (STEMI) at 35.71%, Non-ST elevation myocardial infarction (NSTEMI) at 38.10%, and unstable angina at 26.19%. This balanced distribution is reflective of the multifaceted nature of ACS, a condition that manifests across a spectrum of clinical severities. The slightly higher prevalence of NSTEMI over STEMI in this cohort is a finding that echoes the global trends observed in the study by McManus et al., which noted an increasing incidence of NSTEMI in recent years(19). The prevalence of unstable angina, though lower, remains a significant clinical entity, underscoring the need for vigilant diagnosis and management strategies.

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.

V. CONCLUSION

In conclusion, this study offers a comprehensive analysis of the clinical characteristics, ECG findings, and comorbidity profiles of patients with Acute Coronary Syndrome (ACS) at a tertiary level hospital in Bangladesh. The demographic distribution underscores a significant male predominance and highlights a middle-aged population as the most affected group. The high prevalence of smoking among the study population emerges as a critical modifiable risk factor, necessitating targeted public health interventions. The ECG findings reveal a predominant involvement of anterior leads, suggesting a potential anatomical predilection for coronary artery disease in this cohort. The balanced distribution of STEMI, NSTEMI, and unstable angina cases reflects the diverse clinical spectrum of ACS, emphasizing the need for tailored diagnostic and therapeutic approaches. This study contributes valuable insights into the burden of ACS in Bangladesh and underscores the importance of comprehensive strategies to address the unique challenges faced by this population. Future research should focus on longitudinal studies to explore the prognostic implications of ECG findings in conjunction with comorbidity profiles and aim to include larger, more diverse populations to provide a more comprehensive understanding of ACS in low and middle-income countries.

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REFERENCES

[1]. Cardiovascular Diseases (Cvds) [Internet]. [Cited 2023 Jul 19]. Available From: Https://Www.Who.Int/News-Room/Fact-Sheets/Detail/Cardiovascular-Diseases-(Cvds)
[2]. The Top 10 Causes Of Death [Internet]. [Cited 2023 Nov 4]. Available From: Https://Www.Who.Int/News-Room/Fact-Sheets/Detail/The-Top-10-Causes-Of-Death
[3]. Yusuf S, Reddy S, Ounpuu S, Anand S. Global Burden Of Cardiovascular Diseases: Part I: General Considerations, The Epidemiologic Transition, Risk Factors, And Impact Of Urbanization. Circulation. 2001 Nov 27;104(22):2746–53.
[4]. Islam AKMM, Majumder AAS. Coronary Artery Disease In Bangladesh: A Review. Indian Heart J. 2013 Jul;65(4):424–35.
[5]. Niport NI Of PR And T, Welfare M Of H And F, ICF. Bangladesh Demographic And Health Survey 2017-18. 2020 Oct 1 [Cited 2023 May 25]; Available From: Https://Dhsprogram.Com/Publications/Publication-FR344-DHS-Final-Reports.Cfm
[6]. Khaled MFI, Adhikary DK, Islam MM, Alam MM, Rahman MW, Chowdhury MT, Et Al. Factors Responsible For Prehospital Delay In Patients With Acute Coronary Syndrome In Bangladesh. Medicina (Kaunas). 2022 Sep 2;58(9):1206.
[7]. Muneeb M, Khan AH, Khan Niazi A, Khan MU, Chatha ZJ, Kazmi T, Et Al. Patterns Of Dyslipidemia Among Acute Coronary Syndrome (ACS) Patients At A Tertiary Care Hospital In Lahore, Pakistan. Cureus. 2022 Dec;14(12):E32378.
[8]. Balevski I, Burja S, Petreski T, Piko N, Arva V, Kanič V, Et Al. The Role Of Kidney Function On Patient Survival After Percutaneous Coronary Intervention For Acute Coronary Syndrome In Left Main Coronary Artery Disease. Clin Nephrol. 2021 Suppl;96(1):1–5.
[9]. Hu G, Zhou M, Liu J, Smith SC, Ma C, Ge J, Et Al. Smoking And Provision Of Smoking Cessation Interventions Among Inpatients With Acute Coronary Syndrome In China: Findings From The Improving Care For Cardiovascular Disease In China-Acute Coronary Syndrome Project. Glob Heart. 2020 Oct 23;15(1):72.
[10]. Duan JG, Chen XY, Wang L, Lau A, Wong A, Thomas GN, Et Al. Sex Differences In Epidemiology And Risk Factors Of Acute Coronary Syndrome In Chinese Patients With Type 2 Diabetes: A Long-Term Prospective Cohort Study. Plos One. 2015 Apr 1;10(4):E0122031.
[11]. Ghadri JR, Sarcon A, Jaguszewski M, Diekmann J, Bataiosu RD, Hellermann J, Et Al. Gender Disparities In Acute Coronary Syndrome: A Closing Gap In The Short-Term Outcome. J Cardiovasc Med (Hagerstown). 2015 May;16(5):355–62.
[12]. Mirghani HO. Age Related Differences In Acute Coronary Syndrome Presentation And In Hospital Outcomes: A Cross-Sectional Comparative Study. Pan Afr Med J. 2016 Aug 31;24:337.
[13]. Ho T, Cusack RP, Chaudhary N, Satia I, Kurmi OP. Under- And Over-Diagnosis Of COPD: A Global Perspective. Breathe. 2019 Mar 1;15(1):24–35.
[14]. Varghese T, Kumar A. Predisposing Risk Factors Of Acute Coronary Syndrome (ACS): A Mini Review. Journal Of Pharmaceutical Sciences And Research. 2019;11(5):1999–2002.
[15]. Yagi H, Komukai K, Hashimoto K, Kawai M, Ogawa T, Anzawa R, Et Al. Difference In Risk Factors Between Acute Coronary Syndrome And Stable Angina Pectoris In The Japanese: Smoking As A Crucial Risk Factor Of Acute Coronary Syndrome. Journal Of Cardiology. 2010 May 1;55(3):345–53.
[16]. Howe M, Leidal A, Montgomery D, Jackson E. Role Of Cigarette Smoking And Gender In Acute Coronary Syndrome Events. The American Journal Of Cardiology. 2011 Nov 15;108(10):1382–6.
[17]. Banks E, Joshy G, Korda RJ, Stavreski B, Soga K, Egger S, Et Al. Tobacco Smoking And Risk Of 36 Cardiovascular Disease Subtypes: Fatal And Non-Fatal Outcomes In A Large Prospective Australian Study. BMC Medicine. 2019 Jul 3;17(1):128.
[18]. Sabeen M, Kubra G, Hassan M, Sikandari F, Nadeem D, Murtaza A. Frequency Of Left Anterior Descending Artery Involvement As A Culprit Vessel In Young Patient With ST Elevation Myocardial Infarction. Pakistan Journal Of Medical &Health Sciences. 2022;16(12):262–262.
[19]. Mcmanus DD, Gore J, Yarzebski J, Spencer F, Lessard D, Goldberg RJ. Recent Trends In The Incidence, Treatment, And Outcomes Of Patients With STEMI And NSTEMI. The American Journal Of Medicine. 2011 Jan 1;124(1):40–7.