SRYAHWA PUBLICATIONS

Archives of Cardiology and Cardiovascular Diseases
ISSN: 2638-4744 | Volume 6, Issue 1, 2024
https://doi.org/10.22259/2638-4744.0601005

RESEARCH ARTICLE

Clinical Features and Angiographic Patterns Among 150 Cases of Acute Coronary Syndrome: A Cross-Sectional, Hospital-Based Observational Study

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Received: 03 December 2024 Accepted: 20 December 2024 Published: 27 December 2024

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Abstract

Background: Acute coronary syndrome (ACS) is a major cause of morbidity and mortality worldwide. Identifying clinical characteristics, risk factors, and angiographic profiles of ACS patients can improve management strategies.

Objective: To analyze the clinical profile, major risk factors, and angiographic findings in patients with ACS.

Methods: A cross-sectional, hospital-based observational study was conducted on 150 ACS patients. Demographic variables, risk factors (hypertension, diabetes, smoking, dyslipidemia, family history), clinical presentation, and angiographic findings were recorded. Data were analyzed using descriptive statistics.

Results: Mean age was 56.4 ± 10.8 years; males constituted 68% and females 32%. The most common presentation was ST-elevation myocardial infarction (STEMI, 60%), followed by non-ST elevation ACS (30%) and unstable angina (10%). Major risk factors included hypertension (62%), smoking (48%), diabetes mellitus (40%), dyslipidemia (36%), and positive family history (18%). Angiographic analysis showed single vessel disease (SVD) in 32%, double vessel disease (DVD) in 28%, triple vessel disease (TVD) in 25%, and left main coronary artery disease (LMCA) in 5%. The left anterior descending artery (LAD) was the most commonly involved vessel (64%).

Conclusion: ACS predominantly affects middle-aged males with multiple risk factors. Hypertension, smoking,

Citation: Fahim Khan Mukarram, Samir Kumar Kundu, Lima Asrin Sayami *et al.* Clinical Features and Angiographic Patterns Among 150 Cases of Acute Coronary Syndrome: A Cross-Sectional, Hospital-Based Observational Study. Archives of Cardiology and Cardiovascular Diseases. 2024; 6(1):34-40.

and diabetes were the most prevalent risk factors. LAD was the most frequently involved artery. Early risk factor modification and preventive strategies are essential to reduce ACS burden.

Keywords: Acute Coronary Syndrome, Risk Factors, Angiography, Coronary Artery Disease.

1. Introduction

Acute coronary syndrome (ACS) encompasses a spectrum of clinical conditions ranging from unstable angina to ST-elevation myocardial infarction (STEMI) and non-ST-elevation myocardial infarction (NSTEMI). It represents one of the most common and life-threatening manifestations of coronary artery disease (CAD) and remains a leading cause of morbidity and mortality worldwide [1,2]. Globally, ischemic heart disease accounts for nearly 9 million deaths annually [3]. In South Asia, including Bangladesh and neighboring countries, CAD occurs at a younger age compared to Western populations [4]. Early onset is largely attributed to modifiable risk factors such as hypertension, diabetes mellitus, smoking, dyslipidemia, obesity, and sedentary lifestyle [5]. Coronary angiography remains the gold standard for diagnosing the extent and severity of coronary artery involvement in ACS [6]. Identification of clinical features, risk profiles, and angiographic characteristics provides important insights into disease burden, guiding both preventive and therapeutic strategies. South Asian countries, including Bangladesh, India, Pakistan, Nepal, and Sri Lanka, are experiencing a rapid epidemiological transition from communicable to non-communicable diseases. Within this context, ischemic heart disease has emerged as the most significant non-communicable threat [6]. Several studies have shown that South Asians develop ACS at a younger age compared to Western populations, often one decade earlier [7]. The mean age of onset is reported between 50–55 years, while in Western countries, ACS typically presents after the age of 65 [8]. Multiple explanations have been proposed for this earlier onset, including higher prevalence of metabolic syndrome, insulin resistance, and central obesity in South Asians [9]. In addition, smoking rates are high, especially among males, and hypertension often remains poorly controlled [10]. Genetic predisposition has also been suggested, with family history of premature coronary artery disease being more frequent in South Asian patients compared to Caucasians [11]. The clinical manifestations of ACS range from angina at rest or minimal exertion to severe chest pain with hemodynamic instability. STEMI is characterized by complete occlusion of a coronary artery, leading to transmural myocardial infarction and ST-segment elevation on electrocardiogram (ECG). NSTEMI and unstable angina are usually due to subtotal occlusion, with less severe ECG changes but still associated with significant morbidity and mortality [12]. For example, in Bangladesh, risk factors such as smoking and hypertension are highly prevalent, while obesity and dyslipidemia are becoming increasingly common with urbanization. In addition, limited access to primary PCI facilities often results in delayed reperfusion, increasing the likelihood of STEMI and multivessel disease [13]. Therefore, documenting the clinical, risk factor, and angiographic profile of ACS patients in this population will not only enhance local clinical practice but also contribute to the global literature on ethnic and regional differences in ACS. This study aims to describe the clinical characteristics, risk factors, and angiographic profile of ACS patients admitted to a tertiary care hospital.

2. Methods and Materials

2.1 Study Design and Setting

A cross-sectional observational study was conducted in the Department of Cardiology, National Institute of Cardiovascular Diseases (NICVD), Dhaka, Bangladesh from March 2023 to February 2024, over a period of 12 months.

2.2 Sample Size

150 consecutive patients admitted with ACS.

2.2.1 Inclusion Criteria

- Patients ≥18 years diagnosed with ACS (STEMI, NSTEMI, unstable angina).

2.2.2 Exclusion Criteria

- Patients with congenital heart disease, valvular disease, or prior revascularization.

2.3 Data Collection

- Demographic data: age, sex.
- Clinical profile: type of ACS, presenting symptoms, Killip class.
- Risk factors: hypertension, diabetes mellitus, smoking, dyslipidemia, family history of premature CAD.
- Angiographic findings: number of vessels involved, artery distribution.

2.4 Statistical Analysis

Data analyzed using SPSS v25. Descriptive statistics applied (mean, percentages).

3. Results

This table-1 presents the age, sex distribution, ACS subtypes, and Killip class of the patients. The mean age was 56.4 years, indicating that ACS affects patients in their middle age in our study population. This is younger compared to Western populations, highlighting earlier onset in South Asians. There was a male predominance (68%), which reflects the higher burden of cardiovascular disease in men. Women accounted for 32%, consistent with global gender differences in ACS. The majority of patients presented with STEMI (60%), followed by NSTEMI (30%), while unstable angina accounted for only 10%. This suggests that most patients present late, when complete vessel occlusion has already occurred. In terms of severity, 64% were in Killip Class I, showing no signs of heart failure. However, 21% were in Class II (mild failure), and 15% were in advanced heart failure (Killip III–IV), suggesting that a significant number of patients present with complications.

Table 1. *Baseline Demographic and Clinical Characteristics (n=150)*

Variable	Frequency (%) / Mean ± SD
Age (years)	56.4 ± 10.8
Male	102 (68%)
Female	48 (32%)
STEMI	90 (60%)
NSTEMI	45 (30%)
Unstable Angina	15 (10%)
Killip Class I	96 (64%)
Killip Class II	32 (21%)
Killip Class III–IV	22 (15%)

Most ACS patients are middle-aged men, with STEMI being the commonest presentation, and a considerable proportion present with complications.

This table-2 shows the frequency of cardiovascular risk factors among the patients. Hypertension (62%) was the most prevalent risk factor, underscoring its strong association with ACS. Smoking (48%) was the second most common, particularly among men, highlighting its contribution to thrombus formation and endothelial dysfunction. Diabetes mellitus (40%) was present in nearly half of the cases, confirming its well-known role in accelerating atherosclerosis. Dyslipidemia (36%) was also frequent, reflecting the impact of abnormal lipid metabolism. Family history of premature CAD (18%) was noted, suggesting genetic predisposition. Obesity (14%) was relatively less common, but still an important modifiable factor.

Table 2. *Distribution of Major Risk Factors*

Risk Factor	Frequency (%)
Hypertension	93 (62%)
Smoking	72 (48%)
Diabetes Mellitus	60 (40%)
Dyslipidemia	54 (36%)
Family History	27 (18%)
Obesity (BMI >30)	21 (14%)

Interpretation: *Hypertension, smoking, and diabetes were the leading risk factors in this cohort, consistent with regional and global literature.*

This table-3 describes the extent of coronary artery involvement in the study group. Single Vessel Disease (32%) was most common, followed by Double Vessel Disease (28%). A significant 25% had Triple Vessel Disease, indicating diffuse coronary atherosclerosis. 5% had Left Main Coronary Artery (LMCA) disease, which carries high mortality risk. 10% had normal/minimal changes, showing that some ACS cases may occur due to plaque erosion or spasm rather than significant stenosis.

Table 3. *Angiographic Findings*

Angiographic Profile	Frequency (%)
Normal / Minimal disease	15 (10%)
Single Vessel Disease (SVD)	48 (32%)
Double Vessel Disease (DVD)	42 (28%)
Triple Vessel Disease (TVD)	38 (25%)
LMCA Involvement	7 (5%)

Interpretation: *While single vessel disease is most common, a substantial number have multivessel involvement, emphasizing the severity of CAD in ACS patients.*

This table-4 highlights the specific coronary arteries affected. The Left Anterior Descending (LAD) artery was the most commonly involved (64%), consistent with its anatomical importance in supplying the anterior wall and septum. The Right Coronary Artery (RCA) was involved in 44%, often linked to inferior wall infarctions. The Left Circumflex (LCX) was involved in 32%, associated with lateral wall infarctions. LMCA involvement (5%) was rare but clinically significant due to poor prognosis.

Table 4. *Artery Involvement*

Artery Involved	Frequency (%)
LAD	96 (64%)
RCA	66 (44%)
LCX	48 (32%)
LMCA	7 (5%)

Interpretation: *LAD is the most frequently affected artery, confirming its role as the "widow-maker" vessel, while LMCA lesions remain rare but high risk*.

(A pie chart-1 showing proportions of STEMI, NSTEMI, and Unstable Angina)

- The figure demonstrates that STEMI was the most common ACS presentation (60%), followed by NSTEMI (30%) and Unstable Angina (10%).
- This indicates that most patients seek medical attention late, when coronary occlusion is already complete, leading to ST-elevation myocardial infarction.
- The lower proportion of unstable angina reflects under-diagnosis or delayed presentation.

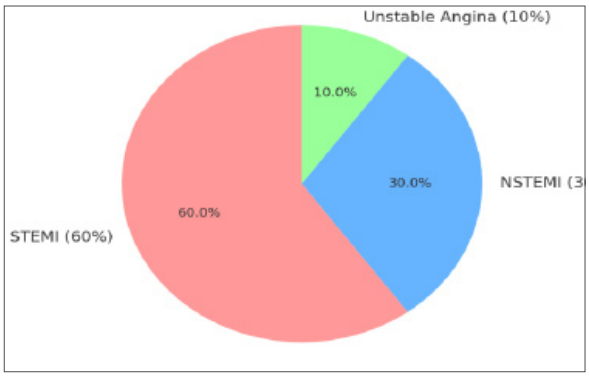

Figure 1. *Distribution of ACS Subtypes*

Analysis: *The predominance of STEMI reflects the urgent need for public awareness, early detection, and availability of primary PCI to reduce complications.*

(A bar graph-2 comparing frequencies of hypertension, smoking, diabetes, dyslipidemia, family history, and obesity)

- Hypertension (62%) was the leading risk factor, followed by smoking (48%) and diabetes mellitus (40%).
- Dyslipidemia (36%) also contributed significantly, while family history (18%) and obesity (14%) were less common.
- The high prevalence of hypertension and diabetes reflects the metabolic and lifestyle profile of South Asian populations.
- Smoking, a preventable risk factor, was strikingly high, especially among males.

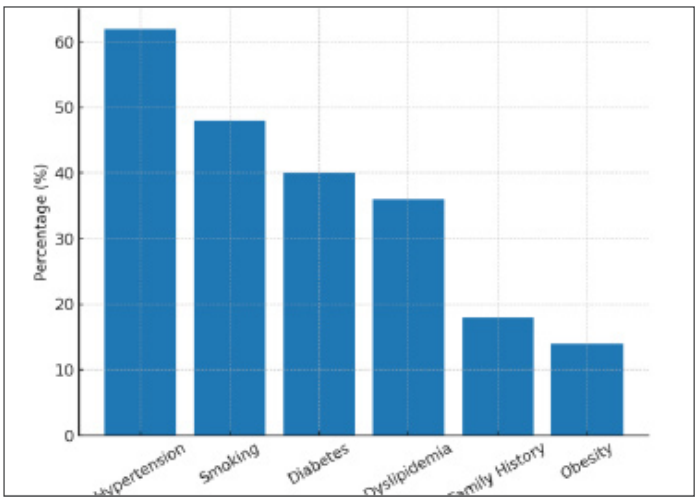

Figure 2. *Prevalence of Risk Factors in ACS Patients*

Analysis: *Hypertension, diabetes, and smoking are the "big three" contributors to ACS in this study, and effective control could substantially reduce disease burden.*

(A bar chart-3 showing proportions of SVD, DVD, TVD, LMCA, and normal/minimal disease)

- Single vessel disease (32%) was the most frequent angiographic finding.
- Double vessel disease (28%) and Triple vessel disease (25%) made up a large proportion, indicating that more than half of patients had multivessel disease.
- LMCA disease (5%) though relatively uncommon, carries serious prognostic implications.
- Normal/minimal disease (10%) suggests that not all ACS cases are due to obstructive atherosclerosis – some may result from plaque erosion, spasm, or microvascular dysfunction.

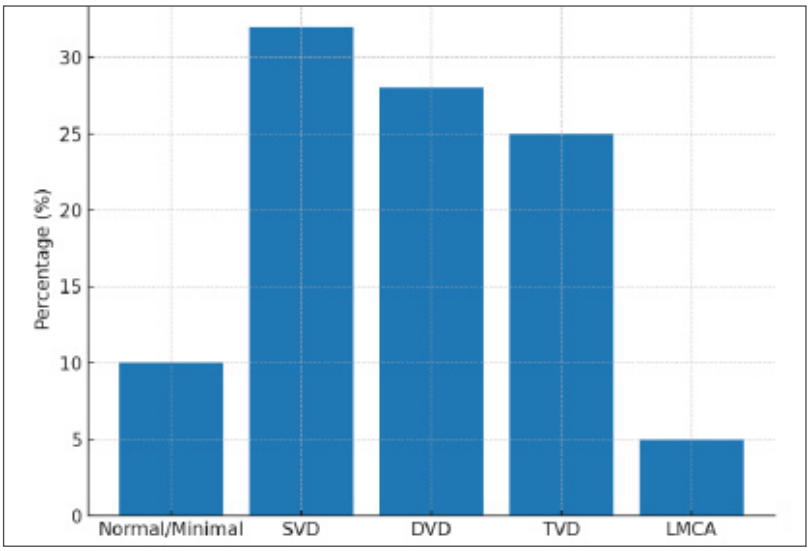

Figure 3. *Angiographic Profile of Patients*

Analysis: *The high percentage of multivessel disease highlights the aggressive nature of atherosclerosis in this population, often requiring surgical or advanced interventional management.*

(A bar graph-4 showing distribution of LAD, RCA, LCX, and LMCA lesions)

- The LAD artery was the most commonly affected (64%), consistent with its role in supplying a major portion of the myocardium.
- The RCA was involved in 44%, typically presenting as inferior wall infarctions.
- The LCX was involved in 32%, which is often associated with lateral wall infarctions.
- LMCA involvement (5%) was the least frequent, but clinically significant as it supplies a large myocardial territory.

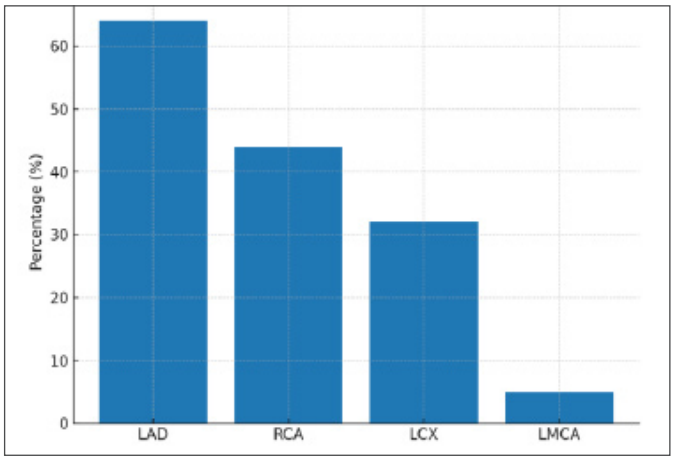

Figure 4. *Frequency of Artery Involvement*

Analysis: *LAD dominance in ACS is consistent with global findings and explains the severe clinical manifestations (extensive anterior wall infarctions). LMCA disease, although rare, necessitates urgent revascularization.*

4. Discussion

This study highlights the demographic, clinical, and angiographic features of 150 ACS patients. The mean age was 56.4 years, which is younger compared to Western cohorts where ACS often presents after 65 years [7]. Similar findings were reported in other South Asian studies [8]. A strong male predominance (68%) was observed, consistent with global trends [9]. Estrogen may play a protective role in pre-menopausal women, explaining the gender disparity [10]. STEMI was the most common presentation (60%), aligning with reports from regional studies [11]. This reflects delayed medical attention and lack of awareness leading to more severe ischemic events. Regarding risk factors, hypertension (62%), smoking (48%), and diabetes (40%) were highly prevalent. Hypertension has been consistently identified as the most common risk factor in ACS [12]. Smoking, particularly prevalent among South Asian men, significantly increases thrombotic risk [13]. Diabetes accelerates atherosclerosis and contributes to multivessel disease [14]. On angiographic evaluation, single-vessel disease (32%) was most common, but a significant proportion had double (28%) and triple vessel disease (25%). This indicates widespread coronary atherosclerosis in a large subset. The LAD was the most commonly affected vessel (64%), similar to prior reports [15], reflecting its anatomical importance as the "widow-maker" artery. The 5% prevalence of left main coronary artery (LMCA) disease is clinically significant, as it carries poor prognosis and mandates revascularization [16]. Overall, these findings emphasize the need for aggressive primary prevention and early detection of risk factors in younger populations. Lifestyle modifications, smoking cessation, hypertension and diabetes control, along with timely reperfusion therapy, are crucial.

5. Conclusion

ACS commonly affects middle-aged males with multiple cardiovascular risk factors, particularly hypertension, smoking, and diabetes. STEMI is the most common presentation. Angiography reveals LAD as the most frequently involved vessel, with a considerable proportion showing multivessel disease. Early prevention, risk modification, and timely intervention are vital to reducing the burden of ACS.

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