

ORIGINAL ARTICLE

Clinical and Angiographic Profile of Acute Coronary Syndrome Patients Undergoing Coronary Angiography at the Kashmir Institute of Cardiology.

Anisa, Sadaf Shabbir Kiani, Shamail Ali Waheed, Maria Majeed, Arifa Iqbal, Saeed Ahmad Alam

Kashmir Institute Of Cardiology (KIC), Divisional Head Quarter And Teaching Hospital (DHQ) Mirpur, Azad Kashmir-Pakistan.

Copyright © The Author(s). 2025 This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.



Citation:

Anisa, Kiani SS, Waheed SA, Majeed M, Iqbal A, Alam SA. Clinical and Angiographic Profile of Acute Coronary Syndrome Patients Undergoing Coronary Angiography at the Kashmir Institute of Cardiology. *PJCVI*. 2025; 5(2): 39-45

Corresponding Author Email:
shamailali.40642@gmail.com

DOI: 10.58889/PJCVI.5.2.39.45

Funding:

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Conflicts of Interests:

The authors declare no conflict of interest related to this publication.

Received 06/04/2025

Accepted 15/07/2025

First Published 01/12/2025

Abstract

Background: Coronary artery disease (CAD) is a leading cause of morbidity and mortality worldwide. Acute coronary syndrome (ACS), including ST-segment elevation myocardial infarction (STEMI), non-ST-segment elevation myocardial infarction (NSTEMI), and unstable angina, represents the most severe manifestation of CAD. Coronary angiography is the gold standard for diagnosing CAD and assessing the extent of coronary involvement. This study aimed to evaluate the demographic characteristics, cardiovascular risk factors, clinical presentation, and angiographic patterns of CAD among patients with ACS undergoing coronary angiography at the Kashmir Institute of Cardiology.

Methodology: A single-center cross-sectional observational study was conducted at the Kashmir Institute of Cardiology, Mirpur, Azad Jammu and Kashmir, Pakistan, from June to October 2025. A total of 100 patients aged >18 years presenting with ACS and undergoing coronary angiography were included using consecutive sampling. Demographic characteristics, clinical presentation, cardiovascular risk factors, and angiographic findings were recorded using a structured data collection form. Significant CAD was defined as $\geq 50\%$ luminal stenosis in a major epicardial coronary artery.

Results: Among the 100 patients, 65% were male, with a mean age of 58 years. Most patients were aged 40–60 years (62%). STEMI was the most common clinical presentation (67%), followed by NSTEMI (19%) and unstable angina (14%). The most prevalent cardiovascular risk factors were diabetes mellitus (76%) and hypertension (74%), followed by smoking (31%), dyslipidemia (7%), and family history of CAD (2%). Coronary angiography showed that double-vessel disease was the most common finding (35%), followed by single-vessel disease (31%) and triple-vessel disease (22%). The left anterior descending artery was the most frequently involved coronary artery.

Conclusion: There is a high prevalence of modifiable cardiovascular risk factors and a predominance of multi-vessel coronary artery disease among patients presenting with ACS. These findings highlight the importance of early detection and effective management of cardiovascular risk factors to reduce the burden of CAD.

Keywords

Coronary Artery Disease, Acute Coronary Syndrome, Coronary Angiography, Myocardial Infarction, Cardiovascular Risk Factors.

Introduction

Coronary artery disease (CAD) is one of the most common cardiovascular disorders and remains the leading cause of mortality worldwide. It encompasses a wide spectrum of clinical conditions ranging from stable angina to acute coronary syndrome (ACS), which includes unstable angina, non-ST-segment elevation myocardial infarction (NSTEMI), and ST-segment elevation myocardial infarction (STEMI)¹. CAD results primarily from the development of atherosclerotic plaques within the coronary arteries, leading to progressive narrowing of the vessel lumen and impaired myocardial perfusion. In severe cases, plaque rupture and thrombosis may result in complete occlusion of the coronary artery and myocardial infarction².

Coronary angiography remains the gold standard diagnostic modality for evaluating coronary artery disease because it allows direct visualization of coronary anatomy, assessment of the severity of stenosis, and identification of the distribution pattern of the disease³. The angiographic pattern of coronary artery involvement has important clinical implications, as it helps guide therapeutic decision-making and provides prognostic information regarding patient outcomes.

The development and progression of CAD are influenced by several demographic and clinical factors. Both modifiable and non-modifiable risk factors contribute significantly to the burden of coronary artery disease. Major modifiable risk factors include diabetes mellitus, hypertension, smoking, dyslipidemia, and sedentary lifestyle, whereas non-modifiable factors include age, gender, and family history of cardiovascular disease⁴. The prevalence and distribution of these risk factors vary across populations and geographical regions.

The angiographic pattern of CAD provides valuable insight into disease severity. Single-vessel disease is often observed in younger individuals, whereas double-vessel disease and triple-vessel disease are more common in older patients and those with long-standing comorbidities. Although less common, left main coronary artery disease is associated with

particularly poor clinical outcomes due to the large myocardial territory it supplies^{5,6}.

Several international studies have reported demographic patterns and clinical characteristics of CAD; however, regional data describing the demographic profile, cardiovascular risk factors, and angiographic patterns of patients with acute coronary syndrome are limited in our population. Understanding these patterns is important for improving prevention strategies and clinical management.

Therefore, the present study was conducted to evaluate the demographic characteristics, clinical profile, cardiovascular risk factors, and angiographic patterns of coronary artery disease among patients presenting with acute coronary syndrome undergoing coronary angiography at the Kashmir Institute of Cardiology.

Methodology

Study Design

This study was designed as a single-center cross-sectional observational study aimed at evaluating the demographic characteristics, clinical profile, cardiovascular risk factors, and angiographic patterns of coronary artery disease (CAD) among patients presenting with acute coronary syndrome (ACS). The study focused on patients undergoing diagnostic coronary angiography to determine the distribution and severity of coronary artery involvement. Because the primary objective was to describe clinical and angiographic characteristics rather than test causal relationships, the study employed a descriptive analytical framework without inferential hypothesis testing.

Ethics

Ethical approval for the study was obtained from the Ethical Review Committee of the Divisional Head Quarter Hospital, Mirpur, Azad Jammu and Kashmir. All procedures were conducted in accordance with institutional ethical standards and principles outlined in the Declaration of Helsinki. Written informed consent was obtained from all participants prior to enrollment. Participants were informed about the purpose of the study, the voluntary nature of their

participation, and their right to withdraw at any time without affecting their medical care. Confidentiality of patient information was strictly maintained, and all collected data were anonymized before analysis.

Setting

The study was conducted at the Kashmir Institute of Cardiology (KIC), Divisional Head Quarter and Teaching Hospital, Mirpur, Azad Jammu and Kashmir, Pakistan. This tertiary care center provides specialized cardiovascular services, including diagnostic coronary angiography and management of acute coronary syndromes. The study period extended from June 2025 to October 2025, during which all eligible patients presenting with ACS and undergoing coronary angiography were evaluated for inclusion in the study.

Participants

The study included 100 adult patients aged greater than 18 years who were admitted with a confirmed diagnosis of acute coronary syndrome and subsequently underwent coronary angiography. Eligible patients included those diagnosed with ST-segment elevation myocardial infarction (STEMI), non-ST-segment elevation myocardial infarction (NSTEMI), or unstable angina based on clinical presentation, electrocardiographic findings, and cardiac biomarkers. Consecutive sampling was used to recruit participants during the study period.

Patients were excluded if they had end-stage renal disease, advanced valvular heart disease, sepsis, malignancy, active bleeding, prior coronary artery bypass graft surgery, contrast allergy, severe hepatic failure, or uncontrolled thyroid disorders, as these conditions could influence angiographic assessment or clinical interpretation.

Variables

The primary variables assessed in the study included demographic characteristics, clinical presentation, cardiovascular risk factors, and angiographic findings. Demographic variables included age and gender. Clinical variables included the type of acute coronary syndrome (STEMI, NSTEMI, or unstable angina) and the anatomical location of myocardial infarction when applicable. Cardiovascular risk

factors assessed were diabetes mellitus, hypertension, smoking status, dyslipidemia, and family history of coronary artery disease. Angiographic variables included the presence and severity of coronary artery stenosis, number of affected vessels, coronary dominance pattern, and presence of coronary anomalies.

Data Sources / Measurement

Data were collected prospectively at the time of patient enrollment using a structured data collection proforma. Demographic and clinical information was obtained from hospital medical records and patient interviews. Smoking status and family history were self-reported by patients. Comorbid conditions such as diabetes mellitus, hypertension, and dyslipidemia were identified based on previous documented diagnosis or current medication use recorded in hospital files.

Coronary angiography was performed using standard institutional protocols. Angiographic findings were interpreted independently by two experienced consultant cardiologists to ensure accuracy. Significant coronary artery disease was defined as $\geq 50\%$ luminal diameter stenosis in any major epicardial coronary artery (left anterior descending artery, left circumflex artery, or right coronary artery) based on visual estimation across multiple angiographic projections. Vessel involvement was categorized as single-vessel disease, double-vessel disease, or triple-vessel disease according to the number of affected major epicardial arteries.

Bias

Several measures were implemented to minimize potential bias. Consecutive patient recruitment during the study period helped reduce selection bias. Standardized data collection using a structured proforma ensured uniform recording of clinical variables. Independent interpretation of angiographic findings by two cardiologists minimized observer bias in the assessment of coronary artery stenosis. However, because the study was conducted at a single tertiary care center and included only patients who underwent angiography, some degree of selection bias may remain.

Study Size

The study included a total of 100 participants, representing all eligible patients undergoing coronary angiography for acute coronary syndrome during the study period. The sample size was determined based on the number of patients presenting to the center within the defined timeframe and meeting the inclusion criteria. The study primarily aimed to provide descriptive insights into demographic and angiographic patterns within this patient population.

Quantitative Variables

Age was recorded as a continuous variable and also categorized into three age groups: <40 years, 40–60 years, and >60 years. Clinical presentation variables were categorized based on ACS subtype (STEMI, NSTEMI, unstable angina). Cardiovascular risk factors were recorded as binary categorical variables (presence or absence). Angiographic findings were categorized based on the number of vessels involved and coronary dominance pattern.

Statistical Methods

Data were analyzed using descriptive statistical methods. Continuous variables such as age were summarized using means, while categorical variables such as gender, ACS type, risk factors, and angiographic patterns were presented as frequencies and percentages. Results were organized into tables to illustrate demographic characteristics, clinical profiles, and angiographic findings. Because the primary objective of the study was descriptive in nature, inferential statistical tests were not performed.

Results

Participants

A total of 100 patients presenting with acute coronary syndrome (ACS) who underwent coronary angiography at the Kashmir Institute of Cardiology during the study period were included in the analysis. All participants fulfilled the eligibility criteria and were successfully evaluated without missing data for the primary study variables. The study population consisted predominantly of male patients (65%), while 35% were female. The mean age of the participants was 58 years, reflecting a middle-to-

older adult population commonly affected by coronary artery disease. Most patients belonged to the 40–60 years age group (62%), followed by those older than 60 years (32%), whereas only 6% were younger than 40 years, indicating that CAD in this population largely affects individuals in the economically productive age range (Table 1).

Descriptive Data

Clinical presentation of ACS varied among participants. ST-segment elevation myocardial infarction (STEMI) was the most frequent presentation, observed in 67% of patients, followed by non-ST-segment elevation myocardial infarction (NSTEMI) in 19% and unstable angina in 14%. Among patients with STEMI, anterior wall myocardial infarction was the most common subtype (35%), followed by inferior wall myocardial infarction (22%), inferior-posterior myocardial infarction (7%), and lateral wall myocardial infarction (3%).

The distribution of cardiovascular risk factors showed a high prevalence of modifiable comorbidities within the study population. Diabetes mellitus was the most common risk factor, present in 76% of patients, followed by hypertension in 74%, smoking in 31%, dyslipidemia in 7%, and family history of coronary artery disease in 2%. These findings indicate a substantial burden of metabolic and lifestyle-related risk factors among individuals presenting with ACS. Detailed demographic characteristics and clinical risk profiles are summarized in Table 1.

Outcome Data

Coronary angiographic evaluation revealed varying patterns of coronary artery involvement. Double-vessel disease (DVD) was the most frequently observed angiographic pattern, present in 35% of patients, followed by single-vessel disease (SVD) in 31% and triple-vessel disease (TVD) in 22%. In contrast, 12% of patients demonstrated non-significant coronary artery disease with less than 50% luminal stenosis.

Regarding vessel involvement, the left anterior descending (LAD) artery was the most frequently affected coronary artery, consistent with the high proportion of anterior wall myocardial infarctions

observed in the clinical presentation. Analysis of coronary dominance patterns showed that right coronary dominance was present in 94% of patients, which represents the typical anatomical pattern in the general population. Coronary artery anomalies were identified in 4% of patients. The distribution of angiographic findings is presented in Table 2.

Main Results

The findings of this study demonstrate that acute coronary syndrome in this population predominantly affects middle-aged men and is strongly associated with modifiable cardiovascular risk factors, particularly diabetes mellitus and hypertension. The majority of patients presented with ST-segment elevation myocardial infarction,

indicating that a substantial proportion of cases present with severe and acute manifestations of coronary artery disease.

Angiographic evaluation further revealed that multi-vessel coronary artery disease was common, with double-vessel disease representing the most frequent pattern of coronary involvement. The left anterior descending artery emerged as the most commonly affected vessel, which corresponds with the predominance of anterior wall myocardial infarction among STEMI cases. These results collectively highlight the significant burden of advanced coronary artery disease and associated metabolic risk factors among patients undergoing coronary angiography in this tertiary care center.

Table 1: Demographics and clinical characteristics of Patients (n=100).

Variables	Frequency
Age Groups	<40
	40-60
	>60
Type Of ACS	STEMI
	NSTEMI
	Unstable Angina
Types Of STEMI	Anterior
	Inferior
	Lateral
	Inferior-Posterior
Risk Factors	Diabetes
	Hypertension
	Smoking
	Dyslipidemia
	Family History

Table 2: Angiogram findings.

Parameters	Frequency
Non- Significant	12
Single vessel disease	31
Double vessel disease	35
Triple vessel disease	22

Discussion

The present study evaluated the demographic characteristics, clinical presentation, cardiovascular risk factors, and angiographic patterns of coronary artery disease among patients presenting with acute coronary syndrome at a tertiary care cardiac center. The findings provide valuable insights into the burden and clinical profile of CAD within this regional population.

In this study, the majority of patients were male and the mean age was 58 years. These findings are consistent with previous regional and international studies, which have reported a higher prevalence of coronary artery disease among men and a greater incidence in middle-aged and older individuals. The predominance of patients within the 40–60 year age group highlights the early onset of CAD in this population and underscores the significant socioeconomic burden associated with cardiovascular disease⁴.

ST-segment elevation myocardial infarction was the most common clinical presentation observed in this study. The predominance of STEMI suggests that many patients present with advanced or acute manifestations of coronary artery disease. Delayed healthcare access, limited awareness of early symptoms, and inadequate control of cardiovascular risk factors may contribute to this pattern of presentation^{7,8}. Additionally, chronic stress-related physiological dysregulation, including alterations in biomarkers, has been implicated in accelerating atherosclerosis and precipitating acute coronary events, further contributing to severe presentations like STEMI⁸.

The study also revealed a high prevalence of modifiable cardiovascular risk factors, particularly diabetes mellitus and hypertension. These findings reflect the increasing burden of metabolic disorders in the region and highlight the importance of early identification and aggressive management of these conditions. Smoking was also observed as a notable risk factor, particularly among male patients, which may reflect sociocultural patterns of tobacco use.

Angiographic findings in the present study demonstrated that double-vessel disease was the most common pattern of coronary artery involvement, followed by single-vessel and triple-vessel disease⁵. The predominance of multi-vessel disease suggests that many patients present with relatively advanced atherosclerotic disease at the time of diagnosis. The left anterior descending artery was the most frequently involved vessel, which corresponds with the higher incidence of anterior wall myocardial infarction observed among STEMI patients⁶.

Coronary dominance analysis revealed that right coronary dominance was present in the majority of patients, which is consistent with known anatomical patterns in the general population. The presence of coronary anomalies in a small proportion of patients is also consistent with findings reported in previous angiographic studies^{9,10}.

Despite these valuable findings, the study has certain limitations. It was conducted at a single tertiary care center with a relatively small sample size, which may limit the generalizability of the results to the broader population. Furthermore, the analysis was primarily descriptive and did not include inferential statistical testing to examine associations between risk factors and angiographic patterns. Additionally, the study included only patients who underwent coronary angiography, which may introduce selection bias.

Nevertheless, the study provides important regional data on the demographic and angiographic patterns of coronary artery disease among patients presenting with acute coronary syndrome and highlights the need for improved preventive strategies and risk factor control.

Conclusion

This study demonstrates that coronary artery disease in patients presenting with acute coronary syndrome is associated with a high burden of modifiable cardiovascular risk factors, particularly diabetes mellitus and hypertension. The findings also indicate a predominance of multi-vessel coronary artery disease, with double-vessel

involvement being the most frequently observed angiographic pattern. These results emphasize the need for early detection, effective management of cardiovascular risk factors, and implementation of preventive healthcare strategies to reduce the growing burden of coronary artery disease in this population. Future multicenter studies with larger sample sizes and analytical statistical approaches are recommended to further understand the epidemiology and clinical patterns of CAD in the region.

Acknowledgment

The authors would like to acknowledge the support and cooperation of the staff of the Kashmir Institute of Cardiology for their assistance during data collection and facilitation of this study. We also thank all the patients who participated in this research.

References

- 1) 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. *Eur Heart J*. 2018;39(2):119-177. doi:10.1093/eurheartj/ehx393.
- 2) Patti G, Cavallari I, Andreotti F, Calabrò P, Cirillo P, Denas G, et al. Prevention of atherothrombotic events in patients with diabetes mellitus: from antithrombotic therapies to new-generation glucose-lowering drugs. *Nat Rev Cardiol*. 2019;16:113-130. doi:10.1038/s41569-018-0080-2.
- 3) Fihn SD, Blankenship JC, Alexander KP, Bittl JA, Byrne JG, Fletcher BJ, et al. 2014 ACC/AHA/AATS/PCNA/SCAI/STS focused update of the guideline for the diagnosis and management of patients with stable ischemic heart disease. *J Am Coll Cardiol*. 2014;64(18):1929-1949. doi:10.1016/j.jacc.2014.07.017.
- 4) Gupta MD, MP G, Kategari A, Batra V, Gupta P, Bansal A, et al. Epidemiological profile and management patterns of acute myocardial infarction in very young patients from a tertiary care center. *Indian Heart J*. 2020;72:32-39. doi:10.1016/j.ihj.2020.03.003.
- 5) Mirzababaei A, Mozaffari H, Shab-Bidar S, Milajerdi A, Djafarian K. Risk of hypertension among different metabolic phenotypes: a systematic review and meta-analysis of prospective cohort studies. *J Hum Hypertens*. 2019;33(5):365-377. doi:10.1038/s41371-018-0146-y.
- 6) Patel MR, Dehmer GJ, Hirshfeld JW, Smith PK, Spertus JA. ACCF/SCAI/STS/AATS/AHA/ASNC 2009 appropriateness criteria for coronary revascularization. *J Am Coll Cardiol*. 2009;53(6):530-553.
- 7) Prajapati D, Sherpa K, Bogati A, Manandhar R, Dhungana M, Roka M, et al. Patterns of Perception of Cardiac Symptoms by Patients Presenting with ST-Segment Elevation Myocardial Infarction and their Knowledge of Coronary Artery Disease Risk Factors.
- 8) Noushad S, Ahmed S, Ansari B, Mustafa UH, Saleem Y, Hazrat H. Physiological biomarkers of chronic stress: a systematic review. *Int J Health Sci (Qassim)*. 2021;15(5):46-59.
- 9) Akkaya H, Güntürk EE. Coronary artery anomalies and dominance: data from a single center in Turkey. *Minerva Cardiology and Angiology*. 2020 Sep 29;70(2):138-147.
- 10) Aricatt DP, Prabhu A, Avadhani R, Subramanyam K, Manzil AS, Ezhilan J, et al. A study of coronary dominance and its clinical significance. *Folia morphologica*. 2023;82(1):102-7.