



RISK FACTOR PROFILE AND IN-HOSPITAL OUTCOMES AMONG PATIENTS WITH ACUTE CORONARY SYNDROME: A PROSPECTIVE OBSERVATIONAL STUDY AT A TERTIARY CARE HOSPITAL

Dr. Bishwa Bhusan Bharti¹, Dr. Manoj Kumar Murli²

¹ Assistant Professor, Department of Cardiology, J.J.M. Medical College, Davangere, Karnataka, India. (drbbbcardiologist@gmail.com)

² Assistant Professor, Department of General Medicine, Mata Gujri Memorial Medical College & Lions Seva Kendra Hospital, Kishanganj, Bihar, India. (manojkumarmurli@gmail.com)

Corresponding Author: Dr. Manoj Kumar Murli

*Department of General Medicine, Mata Gujri Memorial Medical College & Lions Seva Kendra Hospital, Kishanganj, Bihar, India.

ABSTRACT

Background: Acute Coronary Syndrome (ACS) is a major contributor to cardiovascular morbidity and mortality worldwide. The increasing prevalence of cardiovascular risk factors in developing countries, particularly in India, has led to a substantial rise in the burden of ACS. Identification of risk factors and assessment of clinical outcomes are essential for improving preventive and therapeutic strategies.

Objectives: To evaluate the risk factor profile of patients admitted with Acute Coronary Syndrome and to assess their in-hospital clinical outcomes at a tertiary care hospital.

Methods: A prospective observational study was conducted in the Department of Medicine and Coronary Care Unit of a tertiary care hospital from February 2011 to June 2011. A total of 42 consecutive patients diagnosed with ACS, including ST-segment elevation myocardial infarction (STEMI), non-ST-segment elevation myocardial infarction (NSTEMI), and unstable angina, were enrolled. Demographic characteristics, cardiovascular risk factors, clinical presentation, and in-hospital outcomes were recorded using a structured case record form. Data were analyzed using SPSS version 17.0. Associations between risk factors and adverse outcomes were assessed using appropriate statistical tests, with $p < 0.05$ considered statistically significant.

Results: The mean age of the study population was 56.4 ± 11.2 years, and 73.8% of patients were male. Hypertension (57.1%), smoking/tobacco use (52.4%), diabetes mellitus (42.9%), and dyslipidemia (38.1%) were the most common risk factors. STEMI was the predominant clinical presentation, accounting for 59.5% of cases, followed by NSTEMI (23.8%) and unstable angina (16.7%). Most patients recovered without major complications. Heart failure was the most frequent complication (16.7%), followed by arrhythmias (11.9%) and cardiogenic shock (7.1%). The in-hospital mortality rate was 7.1%. Diabetes mellitus demonstrated a significant association with adverse in-hospital outcomes ($p = 0.02$).

Conclusion: Traditional cardiovascular risk factors were highly prevalent among patients with ACS. Hypertension, smoking, diabetes mellitus, and dyslipidemia constituted the major risk factors.

Diabetes mellitus was associated with poorer short-term outcomes. Strengthening preventive measures and optimizing management of modifiable risk factors may improve outcomes and reduce the burden of ACS.

Keywords: Acute Coronary Syndrome; Risk Factors; Myocardial Infarction; Diabetes Mellitus; Hypertension; Cardiovascular Disease; In-Hospital Outcome

INTRODUCTION

Acute Coronary Syndrome (ACS) represents a spectrum of clinical conditions resulting from acute myocardial ischemia and includes ST-segment elevation myocardial infarction (STEMI), non-ST-segment elevation myocardial infarction (NSTEMI), and unstable angina. Cardiovascular diseases remain the leading cause of mortality worldwide, accounting for a substantial proportion of premature deaths and disability. The burden of ischemic heart disease has increased significantly over recent decades, particularly in low- and middle-income countries undergoing rapid epidemiological transition [1]. Despite advances in preventive strategies, diagnostic modalities, and therapeutic interventions, ACS continues to be associated with considerable morbidity, mortality, and healthcare expenditure globally [2].

The pathogenesis of ACS is multifactorial, involving a complex interplay between modifiable and non-modifiable risk factors. Traditional risk factors such as hypertension, diabetes mellitus, dyslipidemia, smoking, obesity, sedentary lifestyle, and family history of coronary artery disease have been consistently associated with increased risk of acute coronary events [3]. In addition, advancing age and male sex remain important determinants of disease occurrence and prognosis [4]. The prevalence of these risk factors has risen steadily in developing nations, contributing to the increasing incidence of ACS.

South Asian populations exhibit a particularly high susceptibility to coronary artery disease, often presenting at a younger age compared with Western populations [5]. India has witnessed a dramatic rise in cardiovascular disease burden over the past few decades, with coronary artery disease emerging as a major public health challenge [6]. Urbanization, lifestyle changes, dietary transitions, increasing prevalence of diabetes mellitus, and tobacco consumption have significantly contributed to this trend. Furthermore, Indians tend to develop coronary artery disease approximately 5–10 years earlier than their counterparts in many developed countries, leading to significant socioeconomic consequences [7].

Within India, regional variations exist in the prevalence of cardiovascular risk factors and outcomes. India has experienced a notable increase in the prevalence of hypertension, diabetes, obesity, and tobacco use, all of which are recognized contributors to ACS [8]. Patients presenting to tertiary care hospitals often have multiple coexisting risk factors, which may influence both clinical presentation and subsequent outcomes. Understanding the distribution of these risk factors among hospitalized patients is essential for developing targeted preventive and therapeutic strategies.

Several studies have evaluated the epidemiology and clinical profile of ACS in different populations; however, considerable heterogeneity exists regarding the prevalence of individual risk factors and their impact on short-term outcomes [9]. Moreover, data from tertiary care centers during the early 2010s remain relatively limited. Local evidence is important because demographic characteristics, healthcare accessibility, socioeconomic status, and risk factor profiles may differ substantially from those reported in national or international studies.

Assessment of risk factors and outcomes among patients with ACS can provide valuable insights into disease patterns, facilitate risk stratification, and assist clinicians in identifying high-risk individuals who may benefit from intensive management. Such information may also support public health initiatives aimed at reducing the burden of cardiovascular disease through early detection and modification of preventable risk factors [10].

Therefore, the present study was undertaken in a tertiary care hospital to evaluate the demographic characteristics and risk factor profile of patients admitted with Acute Coronary Syndrome and to

assess their in-hospital clinical outcomes. The specific objectives were to determine the prevalence of major cardiovascular risk factors among ACS patients and to analyze the association of these factors with short-term clinical outcomes during hospitalization.

METHODOLOGY

Study Design: This was a hospital-based observational prospective study conducted to evaluate the risk factors and clinical outcomes among patients diagnosed with Acute Coronary Syndrome (ACS).

Study Setting: The study was conducted in the Department of Medicine and Coronary Care Unit (CCU) of a tertiary care teaching hospital. The hospital serves as a major referral center catering to both urban and rural populations of the region.

Study Duration: The study was conducted over a period of five months from February 2011 to June 2011.

Study Population: The study population comprised all eligible patients admitted to the Department of Medicine/Coronary Care Unit with a diagnosis of Acute Coronary Syndrome during the study period. ACS included ST-segment elevation myocardial infarction (STEMI), non-ST-segment elevation myocardial infarction (NSTEMI), and unstable angina diagnosed on the basis of clinical presentation, electrocardiographic findings, and relevant cardiac biomarkers according to prevailing standard guidelines.

Inclusion Criteria

Patients aged 18 years and above.

Patients admitted with a confirmed diagnosis of Acute Coronary Syndrome (STEMI, NSTEMI, or unstable angina).

Patients willing to participate and provide written informed consent.

Patients admitted during the study period and available for assessment of in-hospital outcomes.

Exclusion Criteria

Patients unwilling to provide informed consent.

Patients with incomplete clinical records preventing adequate assessment of risk factors or outcomes.

Patients transferred to another institution before completion of initial hospitalization.

Patients with alternative diagnoses mimicking ACS and subsequently ruled out after evaluation.

Sample Size: The sample size was determined based on the expected prevalence of the most common cardiovascular risk factors among ACS patients reported in previous literature.

The formula used for estimating sample size for a descriptive observational study was:

$$n = Z^2 \times p \times q / d^2$$

Where:

n = required sample size

Z = 1.96 at 95% confidence level

p = anticipated prevalence of a major risk factor among ACS patients (50%, taken to maximize sample size)

q = 100 – p = 50%

d = allowable error of 15%

Substituting the values:

$$n = (1.96)^2 \times 50 \times 50 / (15)^2$$

$$n \approx 42.7$$

Accordingly, a minimum sample size of 42 patients was considered adequate and all eligible consecutive patients presenting during the study period were enrolled, resulting in a final sample size of 42.

Sampling Technique: A consecutive sampling technique was employed. All eligible patients admitted with ACS during the study period who fulfilled the inclusion criteria were recruited until the desired sample size was achieved.

Data Collection Tolls & Procedure: After obtaining informed consent, detailed demographic and clinical information was collected using a predesigned and pretested case record form. Information regarding age, sex, smoking status, alcohol consumption, hypertension, diabetes mellitus, dyslipidemia, family history of coronary artery disease, obesity, and previous cardiovascular disease was recorded. Clinical examination findings, electrocardiographic changes, cardiac biomarker results, and relevant laboratory investigations were documented. Patients were classified as STEMI, NSTEMI, or unstable angina according to standard diagnostic criteria. All participants were followed throughout their hospital stay and monitored for predefined clinical outcomes, including recovery without complications, development of heart failure, arrhythmias, cardiogenic shock, reinfarction, and in-hospital mortality.

Study Variables: The independent variables included demographic characteristics (age, sex), cardiovascular risk factors (hypertension, diabetes mellitus, smoking, dyslipidemia, obesity, family history of coronary artery disease, and alcohol use), and type of ACS presentation. The dependent variables comprised in-hospital clinical outcomes, including occurrence of complications such as heart failure, arrhythmias, cardiogenic shock, reinfarction, duration of hospital stay, and in-hospital mortality. The relationship between baseline risk factors and clinical outcomes was evaluated.

Statistical Analysis: Data were entered into Microsoft Excel and analyzed using Statistical Package for the Social Sciences (SPSS) software version 17.0. Continuous variables were summarized as mean $\pm$ standard deviation (SD), while categorical variables were expressed as frequencies and percentages. Associations between categorical variables were assessed using Chi-square test or Fisher's exact test wherever appropriate. Continuous variables between groups were compared using Student's t-test. A p-value of less than 0.05 was considered statistically significant.

Ethical Considerations: Written informed consent was obtained from all participants before enrollment. Confidentiality and anonymity of patient information were maintained throughout the study. Participation was entirely voluntary, and patients were free to withdraw from the study at any stage without affecting their treatment. The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki and prevailing institutional ethical guidelines.

RESULTS

A total of 42 patients with Acute Coronary Syndrome were included in the study. The mean age of the study population was 56.4 ± 11.2 years, with the highest proportion of patients belonging to the 50–59 years age group. Males constituted nearly three-fourths of the study population (Table 1)

Table 1. Demographic Characteristics of Patients with Acute Coronary Syndrome (N = 42)

Variable	Category	Number (n)	Percentage (%)
Age group (years)	<40	4	9.5
	40–49	10	23.8
	50–59	14	33.3
	60–69	9	21.4
	≥ 70	5	11.9
Sex	Male	31	73.8
	Female	11	26.2

Mean age: 56.4 ±11.2 years

Hypertension was the most prevalent cardiovascular risk factor, followed by smoking/tobacco use and diabetes mellitus. Dyslipidemia was present in more than one-third of patients, while obesity and a positive family history of coronary artery disease were less common (Table 2).

Table 2. Distribution of Cardiovascular Risk Factors among ACS Patients (N = 42)

Risk Factor	Number (n)	Percentage (%)
Hypertension	24	57.1
Smoking/Tobacco use	22	52.4
Diabetes mellitus	18	42.9
Dyslipidemia	16	38.1
Obesity (BMI ≥30 kg/m ²)	10	23.8
Alcohol consumption	12	28.6
Family history of CAD	8	19.0

Regarding clinical presentation, STEMI was the predominant form of ACS, accounting for approximately three-fifths of cases, whereas NSTEMI and unstable angina constituted smaller proportions (Table 3).

Table 3. Clinical Spectrum of Acute Coronary Syndrome (N = 42)

Type of ACS	Number (n)	Percentage (%)
STEMI	25	59.5
NSTEMI	10	23.8
Unstable Angina	7	16.7

Most patients experienced an uneventful recovery during hospitalization. Among complications, heart failure was the most frequent adverse event, followed by arrhythmias. Cardiogenic shock and reinfarction were relatively uncommon. The overall in-hospital mortality was 7.1% (Table 4)

Table 4. In-Hospital Outcomes and Complications among ACS Patients (N = 42)

Outcome/Complication	Number (n)	Percentage (%)
Uneventful recovery	26	61.9
Heart failure	7	16.7
Arrhythmias	5	11.9
Cardiogenic shock	3	7.1
Reinfarction	1	2.4
In-hospital mortality	3	7.1

Some patients developed more than one complication; therefore percentages may not total 100%.

Analysis of risk factors and outcomes demonstrated a significant association between diabetes mellitus and adverse in-hospital outcomes (p=0.02). Although hypertension and smoking were more common among patients experiencing complications, these associations did not reach statistical significance (Table 5).

Table 5. Association of Selected Risk Factors with Adverse In-Hospital Outcome* (N = 42)

Risk Factor	Adverse Outcome (n=16)	No Adverse Outcome (n=26)	p-value
Diabetes mellitus present	11	7	0.02
Diabetes mellitus absent	5	19	
Hypertension present	11	13	0.18
Hypertension absent	5	13	
Smoking present	10	12	0.39
Smoking absent	6	14	

Adverse outcome = occurrence of heart failure, arrhythmia, cardiogenic shock, reinfarction, or death during hospitalization.

DISCUSSION

The present hospital-based observational study evaluated the risk factor profile and in-hospital outcomes among patients admitted with Acute Coronary Syndrome (ACS) at a tertiary care hospital. The study demonstrated that ACS occurred predominantly in middle-aged and elderly individuals, with a marked male predominance. Hypertension, smoking/tobacco use, diabetes mellitus, and dyslipidemia emerged as the most prevalent cardiovascular risk factors. STEMI constituted the commonest clinical presentation, while heart failure was the most frequent in-hospital complication. Diabetes mellitus showed a significant association with adverse in-hospital outcomes.

The mean age of patients in the present study was 56.4 years, and the majority belonged to the 50–59-year age group. These findings are consistent with previous Indian and international studies that have reported the occurrence of ACS predominantly in the fifth and sixth decades of life [6,7]. The relatively younger age at presentation compared with Western populations has been recognized as a characteristic feature of coronary artery disease in South Asians and may be attributable to genetic susceptibility, increasing prevalence of metabolic risk factors, and lifestyle-related influences [5,7]. A substantial male predominance was observed in the present study. Similar observations have been reported in the CREATE registry and several other studies evaluating ACS in developing countries [7]. The higher incidence among males has traditionally been attributed to greater exposure to behavioral risk factors such as smoking and occupational stress, although the protective influence of endogenous estrogens in premenopausal women may also contribute to gender differences in disease occurrence [4].

Hypertension was the most common risk factor identified, affecting more than half of the study population. This observation aligns with previous reports indicating hypertension as a major contributor to coronary artery disease in India [6,8]. Persistent elevation of blood pressure accelerates endothelial dysfunction, promotes atherosclerotic plaque formation, and increases myocardial oxygen demand, thereby predisposing individuals to acute coronary events. Smoking and tobacco use were also highly prevalent among study participants, reflecting the continued importance of tobacco exposure as a modifiable cardiovascular risk factor. The findings are in agreement with the INTERHEART study, which demonstrated a strong association between tobacco use and myocardial infarction across diverse populations [3].

Diabetes mellitus was present in nearly two-fifths of patients and was significantly associated with adverse in-hospital outcomes. This finding is clinically important because diabetes is known to promote diffuse atherosclerosis, endothelial dysfunction, platelet activation, and impaired collateral vessel formation. Diabetic patients often present with more extensive coronary involvement and may experience worse outcomes following acute coronary events [5]. The observed association between diabetes and complications in the present study supports existing evidence emphasizing the need for aggressive risk factor control and close monitoring of diabetic ACS patients.

Dyslipidemia was observed in over one-third of participants, consistent with previous Indian studies highlighting the growing burden of lipid abnormalities among individuals with coronary artery disease [5,6]. The coexistence of dyslipidemia with other cardiovascular risk factors may further amplify the risk of plaque instability and thrombotic events. The clustering of multiple risk factors observed in this study underscores the multifactorial nature of ACS and the importance of comprehensive cardiovascular risk assessment.

Regarding clinical presentation, STEMI represented the majority of ACS cases. Similar patterns were reported by Xavier et al. in the CREATE registry, where STEMI constituted a substantial proportion of admissions for ACS in India [7]. Delayed healthcare-seeking behavior, limited awareness of early symptoms, and delayed access to specialized cardiac care may partly explain the predominance of STEMI presentations in tertiary care centers during this period.

Heart failure was the most common in-hospital complication observed in the present study. This finding is biologically plausible because extensive myocardial damage following acute ischemia can impair ventricular function and precipitate heart failure. Arrhythmias and cardiogenic shock were less frequent but remained important contributors to morbidity. The observed in-hospital mortality rate was comparable to rates reported in contemporary registries and hospital-based studies evaluating ACS management in developing countries [7,9].

The findings of the present study have important clinical and public health implications. The high prevalence of modifiable risk factors such as hypertension, smoking, diabetes, and dyslipidemia highlights the need for strengthened preventive strategies, including lifestyle modification, early screening, and effective long-term management of cardiovascular risk factors. Identification of diabetes mellitus as a predictor of adverse outcomes suggests that diabetic patients presenting with ACS require intensive monitoring and evidence-based management to improve prognosis.

The strengths of this study include prospective data collection, standardized assessment of risk factors, and evaluation of clinically relevant in-hospital outcomes in a real-world tertiary care setting. The study provides region-specific information regarding ACS patients during the study period.

However, certain limitations should be acknowledged. The study was conducted at a single tertiary care center and included a relatively small sample size, which may limit generalizability. Only short-term in-hospital outcomes were assessed, and long-term follow-up was not performed. Furthermore, detailed angiographic findings and advanced risk stratification measures were not available for all participants. Despite these limitations, the study contributes valuable information regarding the risk factor burden and short-term outcomes of ACS patients in tertiary care setting.

CONCLUSION

Acute Coronary Syndrome remains a major cause of hospitalization and cardiovascular morbidity in the adult population. The present study demonstrated that ACS predominantly affected middle-aged and older adults, with a marked male predominance. Hypertension, smoking/tobacco use, diabetes mellitus, and dyslipidemia were the most frequently identified cardiovascular risk factors. ST-segment elevation myocardial infarction was the commonest clinical presentation among hospitalized patients. Most patients experienced favorable in-hospital outcomes; however, complications such as heart failure, arrhythmias, and cardiogenic shock were observed in a significant proportion. Diabetes mellitus was found to be associated with adverse in-hospital outcomes, highlighting its importance as a prognostic factor in ACS patients. These findings emphasize the need for early identification and effective control of modifiable cardiovascular risk factors through community-based prevention programs and routine clinical screening. Particular attention should be directed toward optimal management of diabetes mellitus among individuals at risk of coronary artery disease. Larger multicentric studies with long-term follow-up are recommended to further evaluate determinants of outcomes and guide evidence-based strategies for reducing the burden of ACS in the Indian population.

DECLARATIONS

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Conflict of Interest: The authors declare that there is no conflict of interest.

Informed Consent: Written informed consent was obtained from all participants prior to enrollment in the study.

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REFERENCES

1. Melberg T, Burman R, Dickstein K. The impact of the 2007 ESC–ACC–AHA–WHF Universal definition on the incidence and classification of acute myocardial infarction: A retrospective cohort study. *International journal of cardiology*. 2010 Mar 18;139(3):228-33.
2. WHO G. Global status report on noncommunicable diseases 2010.
3. Yusuf S, Hawken S, Ôunpuu S, Dans T, Avezum A, Lanus F, McQueen M, Budaj A, Pais P, Varigos J, Lisheng L. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. *The lancet*. 2004 Sep 11;364(9438):937-52.
4. Anderson JL, Adams CD, Antman EM, Bridges CR, Califf RM, Casey Jr DE, Chavey WE, Fesmire FM, Hochman JS, Levin TN, Lincoff AM. ACC/AHA 2007 guidelines for the management of patients with unstable angina/non–ST-elevation myocardial infarction: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Writing Committee to Revise the 2002 Guidelines for the Management of Patients With Unstable Angina/Non–ST-Elevation Myocardial Infarction): developed in collaboration with the American College of Emergency Physicians, the Society for Cardiovascular Angiography and Interventions *Circulation*. 2007 Aug 14;116(7):e148-304.
5. Enas EA, Mohan V, Deepa M, Farooq S, Pazhoor S, Chennikkara H. The metabolic syndrome and dyslipidemia among Asian Indians: a population with high rates of diabetes and premature coronary artery disease. *Journal of the cardiometabolic syndrome*. 2007 Sep;2(4):267-75.
6. Gupta R. Recent trends in coronary heart disease epidemiology in India. *Indian heart journal*. 2008 Mar 1;60(2 Suppl B):B4-18.
7. Xavier D, Pais P, Devereaux PJ, Xie C, Prabhakaran D, Reddy KS, Gupta R, Joshi P, Kerkar P, Thanikachalam S, Haridas KK. Treatment and outcomes of acute coronary syndromes in India (CREATE): a prospective analysis of registry data. *The Lancet*. 2008 Apr 26;371(9622):1435-42.
8. Reddy KS, Prabhakaran D, Chaturvedi V, Jeemon P, Thankappan KR, Ramakrishnan L, Mohan BM, Pandav CS, Ahmed FU, Joshi PP, Meera R. Methods for establishing a surveillance system for cardiovascular diseases in Indian industrial populations. *Bulletin of the world health organization*. 2006 Jun;84(6):461-9.
9. Fox KA, Goodman SG, Klein WF, Brieger D, Steg PG, Dabbous O, Avezum A. Management of acute coronary syndromes. Variations in practice and outcome. Findings from the Global Registry of Acute Coronary Events (GRACE). *European heart journal*. 2002 Aug 1;23(15):1177-89.
10. World Health Organization. Prevention of Cardiovascular Disease. pocket guidelines for assessment and management of cardiovascular risk. africa: Who/Ish Cardiovascular Risk Prediction Charts for the African Region. World Health Organization; 2007.
11. Fox KA, Carruthers KF, Dunbar DR, Graham C, Manning JR, De Raedt H, Buysschaert I, Lambrechts D, Van de Werf F. Underestimated and under-recognized: the late consequences of acute coronary syndrome (GRACE UK–Belgian Study). *European heart journal*. 2010 Nov 1;31(22):2755-64.

12. Van de Werf F, Bax J, Betriu A, Blomstrom-Lundqvist C, Crea F, Falk V, Filippatos G, Fox K, Huber K, Kastrati A, Rosengren A. ESC guidelines on management of acute myocardial infarction in patients presenting with persistent ST-segment elevation. *Revista espanola de cardiologia*. 2009 Mar 1;62(3):293.
13. Writing Group Members, Lloyd-Jones D, Adams RJ, Brown TM, Carnethon M, Dai S, De Simone G, Ferguson TB, Ford E, Furie K, Gillespie C. Heart disease and stroke statistics—2010 update: a report from the American Heart Association. *Circulation*. 2010 Feb 23;121(7):e46-215.