

Retrospective Analysis of Epidemiological Profile, Clinical Characteristics, Management and Outcomes of Patients with Acute Coronary Syndrome at a Tertiary Care Centre

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Conflict of interest: Nil

Abstract:

Background: Acute coronary syndrome (ACS) is one of the primary causes of morbidity and death globally and is a major public health concern in developing nations like India. The increased incidence of ACS has contributed considerably due to the increased prevalence of hypertension, diabetes mellitus, smoking, dyslipidaemia and sedentary lifestyle. Early diagnosis and timely care are important for better clinical outcome and reduced mortality.

Aim: To study the epidemiological profile, clinical features, therapy and outcome of patients presenting with acute coronary syndrome in tertiary care facility.

Methodology: The retrospective observational research was done on 175 patients diagnosed with ACS admitted to the Department of Cardiology, Netaji Subhas Medical College and Hospital, Bihta, Patna, Bihar, India. Data were collected from hospital records in a predesigned data collecting format addressing demographic profile, risk factors, clinical presentation, investigations, treatment, complications and outcome. Appropriate descriptive statistical techniques were used and p-value <0.05 was regarded statistically significant.

Result: Majority of patients were in age bracket of 51-60 years (31.4%) and males were 69.7% of cases. The greatest risk factors were hypertension (56.0%), smoking (49.1%) and diabetes mellitus (42.3%). STEMI was the most frequent ACS (54.9%). All the patients had chest discomfort. PCI was done in 34.9 % of patients and thrombolysis was given in 32.6 % of instances. The most frequent consequence was arrhythmia (16.6%). 89.1% of patients were discharged in a stable condition. Mortality was reported in 6.3% of cases.

Conclusion: ACS mostly occurred in middle-aged males and hypertension; smoking and diabetes were the key related risk factors. STEMI was the commonest clinical manifestation. Early diagnosis, prompt management and successful risk factor modification are critical for better results and reduction of ACS associated morbidity and death.

Keywords: Acute Coronary Syndrome, STEMI, NSTEMI, Risk Factors, Percutaneous Coronary Intervention, Retrospective Study, Cardiovascular Disease.

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Introduction

Cardiovascular diseases (CVDs) continue to be a major cause of morbidity and death globally and a serious public health problem especially in developing nations like India. The World Health Organization has reported that ischaemic heart disease accounts for a significant percentage of fatalities annually worldwide and the burden of this illness is growing in emerging countries due to rapid urbanisation, lifestyle changes and epidemiological shift [1]. Coronary artery disease (CAD) is one of the major health problems of the country [2] and cardiovascular disorders are responsible for about one-fourth of all fatalities in India. Moreover, Indians develop CAD about a decade earlier than Western population which leads to higher disability-

adjusted life years (DALYs), economic burden and loss of productivity during the most active years of life [3,4].

Acute Coronary Syndrome (ACS) is a group of clinical entities induced by acute myocardial ischaemia, including ST-segment elevation myocardial infarction (STEMI), non-ST-segment elevation myocardial infarction (NSTEMI) and unstable angina (UA) [5]. ACS is one of the commonest medical crises faced in tertiary health care settings and has significant risks of death and sequelae if not recognised and addressed immediately. Despite advances in diagnostic techniques, pharmacologic treatment and

interventional cardiology, ACS remains a severe burden on health care systems around the world [6].

The epidemiology picture of ACS has changed significantly in the last decades. Classic risk factors such as hypertension, diabetes mellitus, dyslipidaemia, smoking, obesity, sedentary lifestyle and family history still have a high association with development of coronary artery disease [7]. However, altering dietary habits, rising stress levels, tobacco smoking, alcohol intake and decreasing physical activity have further accelerated the prevalence of ACS in the Indian population [8]. Moreover, these individuals generally have many comorbid diseases that complicate the clinical presentation and management results.

The clinical presentation of ACS can be highly variable, ranging from classic chest pain to unusual symptoms such as dyspnoea, epigastric discomfort, sweating, nausea or syncope [9]. Early detection of these symptoms and early treatment is crucial in order to minimise myocardial damage and enhance survival results. Electrocardiography, cardiac biomarkers, echocardiography and coronary angiography play an important role in diagnosis, risk classification and therapy planning of ACS patients [10]. Presently, therapeutic methods include antiplatelet medication, anticoagulants, thrombolytic therapy, percutaneous coronary intervention (PCI), coronary artery bypass grafting (CABG), and optimum medical therapy based on the severity and subtype of ACS [11].

Few studies have been done to assess ACS in western nations. However, there is paucity of data on epidemiological profile, care and outcomes of ACS patients in Eastern India notably in Bihar. Regional differences in socioeconomic status, access to healthcare, literacy and incidence of cardiovascular risk factors can have a major impact on the presentation and prognosis of illness. Thus, knowledge on local epidemiological patterns and clinical features of ACS patients is needed to improve preventative initiatives, optimise treatment protocols and reduce mortality rates.

Tertiary care centres are an important aspect in the diagnosis and management of ACS due to availability of specialised cardiology services, intensive care facilities and modern interventional techniques. Netaji Subhas Medical College and Hospital, Bihta, Patna, Bihar is a major Referral Centre servicing a huge population from urban and rural areas of Bihar and neighbouring states. A retrospective analysis of the ACS patients hospitalised in this institute may give useful information on the demographic distribution, clinical profile, risk factor profiles, management techniques and treatment results among patients visiting this tertiary care center.

Retrospective studies are particularly valuable to assess patterns in illness incidence, treatment methods, complications and in-hospital outcomes over a given period. These types of analyses assist clinicians and policymakers in evaluating the efficacy of current health care services and in formulating evidence-based plans to enhance patient care. Moreover, hospital based research data contributes considerably to the regional and national cardiovascular registries, thereby improving the general understanding of ACS trends in India.

With this background the present study entitled “Retrospective Analysis of Epidemiological Profile, Clinical Characteristics, Management and Outcomes of Patients with Acute Coronary Syndrome at a Tertiary Care Centre” was undertaken in the Department of Cardiology, Netaji Subhas Medical College and Hospital, Bihta, Patna, Bihar, India. Objective: To analyse the demographic profile, risk factor distribution, clinical presentation, therapeutic modalities and in-hospital outcomes of patients with ACS. The outcomes of this study are likely to give useful information on burden and pattern of ACS in this region and may help to improve early diagnosis, treatment techniques and overall cardiovascular healthcare delivery.

Methodology

Study Design: The present investigation was a retrospective observational study centred in hospital in a single tertiary care facility. The study aims to analyse the epidemiological profile, clinical features, therapeutic options and outcomes of individuals diagnosed with Acute Coronary Syndrome (ACS).

Study Area: The study was carried out in the Department of Cardiology, Netaji Subhas Medical College and Hospital, Bihta, Patna, Bihar, India.

Study Duration: The research was carried out over one year.

Sample Size: In all, 175 individuals with Acute Coronary Syndrome were enrolled in the trial.

Population Sample: The research population included patients hospitalised to the Cardiac Care Unit (CCU) and Department of Cardiology with diagnosis of Acute Coronary Syndrome including ST-elevation myocardial infarction (STEMI), Non-ST-elevation myocardial infarction (NSTEMI) and unstable angina.

The diagnosis of acute myocardial infarction was made based on the Fourth Universal Definition of Myocardial Infarction. Diagnosis of NSTEMI-ACS was made according to the criteria of the American Heart Association (AHA). The diagnosis of STEMI was determined by ECG in individuals with fresh ST-segment elevation at the J spot in two contiguous leads with standard criteria.

Data Collection: Data were acquired from hospital medical records retrospectively using a pre-designed structured proforma. Demographic profile, clinical presentation, cardiovascular risk factors, laboratory tests, ECG results, echocardiographic parameters, angiographic profile, treatment methods, complications and clinical outcomes of the patients of Acute Coronary Syndrome were reported.

Inclusion Criteria

- Patients > 18 years of age diagnosed with Acute Coronary Syndrome.
- Patients admitted to the Department of Cardiology during the research period
- Patients having comprehensive medical records, including clinical, laboratory, ECG, echocardiographic and therapy information.

Exclusion Criteria

- Patients having missing or partial medical records.
- Congenital heart disease or non-cardiac chest discomfort patients.
- Patients who did not participate or whose records did not provide the diagnostic information needed.
- Readmission instances of the same patient during the research period were eliminated to avoid duplication.

Procedure: After gaining ethical permission, the medical records of patients diagnosed with Acute Coronary Syndrome during the time of investigation were reviewed retrospectively. Eligible patients meeting the inclusion criteria were enrolled in the trial. Information about demographic profile,

clinical features, laboratory investigations, ECG results, echocardiographic evaluation, angiographic profile, modalities of care and outcome were gathered from hospital records and tabulated in a systematic data collecting proforma.

Patients were categorised as STEMI, NSTEMI and unstable angina using established diagnostic criteria. Clinical outcomes including cardiogenic shock, arrhythmias, heart failure, length of hospitalisation, and in-hospital death were examined.

Statistical Analysis: Data were input in Microsoft Excel 2016 and analysed using SPSS version 23.0 (IBM Corporation, USA). Continuous data were reported as mean $\pm$ standard deviation (SD) or median and interquartile range (IQR), while categorical variables were expressed as frequencies and percentages. Student's t-test, Mann-Whitney U test, Chi-square test or Fisher's exact test were performed as appropriate. Statistical significance was defined as $p < 0.05$.

Result

Table 1. Distribution of patients by age group. Majority of the total 175 patients were in age group of 51-60 years with 55 (31.4%) patients followed by 41-50 years with 42 (24.0%) patients. The patients aged from 61 to 70 years were 34 (19.4%) instances and 28 (16.0%) patients aged ≤ 40 years. The minimum number of patients was in the age category of >70 years (16, 9.1%). The results showed that acute coronary syndrome was more prevalent in middle-aged and older people.

Table 1: Distribution of Patients According to Age Group		
Age Group (Years)	Frequency (n)	Percentage (%)
≤ 40	28	16
41-50	42	24
51-60	55	31.4
61-70	34	19.4
>70	16	9.1
Total	175	100

The distribution of study participants by sex is shown in Table 2. Among 175 cases, men were the predominant sex with 122 (69.7%) individuals while females accounted for 53 (30.3%) patients. The

results indicated that acute coronary syndrome was more common in males than females in the current research.

Table 2: Distribution According to Gender		
Gender	Frequency (n)	Percentage (%)
Male	122	69.7
Female	53	30.3
Total	175	100

The distribution of patients according to the different risk factors associated with acute coronary syndrome is described in Table 3. The most prevalent risk factor was hypertension, which was

present in 98 (56.0%) patients, followed by smoking in 86 (49.1%) patients and diabetes mellitus in 74 (42.3%) patients. Dyslipidaemia was found in 69 (39.4%) individuals. Alcohol use and obesity were

seen in 52 (29.7%) and 48 (27.4%) patients respectively. A family history of coronary artery disease was found in 27 (15.4%) participants. The

findings revealed hypertension, smoking, and diabetes mellitus as key risk factors among ACS patients.

Table 3: Distribution According to Risk Factors

Risk Factor	Frequency (n)	Percentage (%)
Hypertension	98	56
Diabetes Mellitus	74	42.3
Smoking	86	49.1
Alcohol Consumption	52	29.7
Dyslipidemia	69	39.4
Family History of CAD	27	15.4
Obesity	48	27.4

The distribution of patients according to the kind of acute coronary syndrome is shown in Table 4. The most prevalent presentation was STEMI in 96 (54.9%) individuals followed by NSTEMI in 48

(27.4%) participants and unstable angina in 31 (17.7%) patients. The results suggest that ST-elevation myocardial infarction was the prevalent type of ACS in the research subjects.

Table 4: Distribution According to Type of Acute Coronary Syndrome

Type of ACS	Frequency (n)	Percentage (%)
STEMI	96	54.9
NSTEMI	48	27.4
Unstable Angina	31	17.7
Total	175	100

Table 5 shows the clinical presentation of individuals with acute coronary syndrome. Chest discomfort was the most prevalent presenting symptom, seen in all 175 (100%) individuals. Sweating was found in 121 (69.1%) individuals followed by dyspnoea in 67 (38.3%) patients.

Nausea/vomiting and palpitations were seen in 42 (24.0%) and 31 (17.7%) individuals respectively. Syncope was the least prevalent symptom seen in 12 (6.9%) participants. These data imply that chest discomfort and autonomic symptoms are the primary clinical features in people with ACS.

Table 5: Clinical Presentation of Patients

Clinical Feature	Frequency (n)	Percentage (%)
Chest Pain	175	100
Sweating	121	69.1
Breathlessness	67	38.3
Nausea/Vomiting	42	24
Palpitations	31	17.7
Syncope	12	6.9

Table 6 Distribution of patients according to management method Sixty-one (34.9%) patients had percutaneous coronary intervention (PCI) while 57 (32.6%) patients received thrombolysis. Medical therapy alone was given to 48 (27.4%) patients, and

coronary artery bypass grafting (CABG) was performed in 9 (5.1%) patients. The results show that PCI was the most prevalent treatment technique in the studied population.

Table 6: Distribution According to Management Strategy

Management Strategy	Frequency (n)	Percentage (%)
Medical Management	48	27.4
Thrombolysis	57	32.6
Percutaneous Coronary Intervention	61	34.9
CABG	9	5.1
Total	175	100

Table 7. Distribution of in-hospital complications in individuals with acute coronary syndrome. Arrhythmias were the most prevalent complication, noted in 29 (16.6%) individuals, followed by heart failure in 21 (12.0%) patients and cardiogenic shock

in 14 (8.0%) patients. Reinfarction and stroke were observed in 8 (4.6%) and 3 (1.7%) individuals, respectively. No problems were found in 100 (57.1%) individuals. The results of this study demonstrate that although most patients had a

favourable outcome throughout their hospital stay, cardiovascular problems were nonetheless identified in a considerable number of instances.

Table 7: Distribution According to In-Hospital Complications

Complication	Frequency (n)	Percentage (%)
Arrhythmia	29	16.6
Cardiogenic Shock	14	8
Heart Failure	21	12
Reinfarction	8	4.6
Stroke	3	1.7
No Complication	100	57.1

The fate of patients hospitalised with acute coronary syndrome is shown in Table 8. Most of the patients 156 (89.1%) were released in stable condition while 8 (4.6%) patients were sent to higher facilities for

further therapy. Mortality was recorded in 6.3% (11) of patients during the hospital stay. The results show a generally good prognosis in majority of the patients, while in-hospital mortality remained high.

Table 8: Outcome of Patients

Outcome	Frequency (n)	Percentage (%)
Discharged Stable	156	89.1
Referred Higher Centre	8	4.6
Death	11	6.3
Total	175	100

Table 9 shows the connection between acute coronary syndrome type and patient prognosis. 81 (84.4%) patients were discharged in stable condition while death was found in 8 (8.3%) patients of STEMI patients. The relatively better result in NSTEMI patients was stable discharge in 45 (93.8%) patients and death in 2 (4.2%) instances.

Thirty (96.8%) of unstable angina patients were discharged stable and only 1 (3.2%) patient reported death. The connection of the type of ACS with outcome was statistically significant ($p=0.041$) with worse result in patients with STEMI compared to NSTEMI and unstable angina instances.

Table 9: Association Between Type of ACS and Outcome

Type of ACS	Stable Discharge n (%)	Referred n (%)	Death n (%)	Total
STEMI	81 (84.4)	7 (7.3)	8 (8.3)	96
NSTEMI	45 (93.8)	1 (2.1)	2 (4.2)	48
Unstable Angina	30 (96.8)	0 (0.0)	1 (3.2)	31
Total	156	8	11	175

Table 10 shows the mean length of hospital stay among the study participants. The mean duration of hospital stay was 5.8 ± 2.4 days, which is a modest

duration of hospitalisation in patients hospitalised with acute coronary syndrome.

Table 10: Mean Duration of Hospital Stay

Variable	Mean $\pm$ SD
Duration of Hospital Stay (Days)	5.8 ± 2.4

Echocardiographic findings in individuals with acute coronary syndrome are shown in Table 11. Normal left ventricular function was seen in 61 individuals (34.9%) and moderate left ventricular impairment in 58 patients (33.1%). 39 (22.3%) and

17 (9.7%) patients had moderate and severe left ventricular dysfunction respectively. The data reveal that a large number of ACS patients had different degrees of ventricular dysfunction.

Table 11: Echocardiographic Findings

Echocardiographic Finding	Frequency (n)	Percentage (%)
Normal LV Function	61	34.9
Mild LV Dysfunction	58	33.1
Moderate LV Dysfunction	39	22.3
Severe LV Dysfunction	17	9.7
Total	175	100

Table 12 Distribution of patients according to Killip categorisation. Most of the patients were in Killip Class I in 113 (64.6%) patients followed by class II in 37 (21.1%) individuals. Killip Class III and IV

were seen in 16 (9.1%) and 9 (5.1%) cases respectively. This suggests that majority of the patients did not have overt cardiac failure at the time of admission.

Table 12: Distribution According to Killip Classification		
Killip Class	Frequency (n)	Percentage (%)
Class I	113	64.6
Class II	37	21.1
Class III	16	9.1
Class IV	9	5.1
Total	175	100

Discussion

The present retrospective study was done to investigate the epidemiological profile, clinical features, therapy, and outcomes of patients presenting with acute coronary syndrome (ACS) at a tertiary care facility. A total of 175 participants were enrolled for the trial. ACS is still one of the major causes of cardiovascular morbidity and mortality worldwide, especially in developing countries like India where changing lifestyle patterns, smoking, hypertension, diabetes mellitus and obesity are playing a major role in the increasing disease burden”.

In the present study, the bulk of the patients were in the age category of 51–60 years (31.4%) followed by 41–50 years (24.0%). Similar findings were also observed by Revaiah et al where majority of ACS patients were middle aged [12]. Advancing age is a major non-modifiable risk factor for coronary artery disease due to progressive atherosclerotic alterations, endothelial dysfunction and extended exposure to cardiovascular risk factors. Studies by Gupta et al. and Xavier et al. also showed that ACS is more frequent in middle-aged and elderly people in India [13].

In the current study males were predominant accounting for 69.7% of the cases, while females accounted for 30.3%. Similar male dominance has been regularly seen across several Indian and international ACS registries [14]. The higher frequency among males may be due to increased smoking habits, alcohol intake, job stress and more exposure to cardiovascular risk factors. Moreover, estrogen-mediated cardio protective benefits among premenopausal women may explain the considerably lower frequency among females.

The most prevalent risk factor found in the present study was hypertension which was present in 56.0% of patients followed by smoking (49.1%) and diabetes mellitus (42.3%). Similar findings were observed in the CREATE registry and Kerala ACS registry where hypertension and smoking were identified as key factors for ACS [15]. Smoking is an important modifiable risk factor for endothelial

damage, platelet aggregation, vasoconstriction, and accelerated atherosclerosis. In addition, diabetes mellitus is a major cause of coronary artery disease via metabolic imbalances, endothelial dysfunction, and chronic inflammation. The prevalence of dyslipidaemia in the present research was 39.4%, which is similar to the results published by Revaiah et al. [12].

In the current study, ST-elevation myocardial infarction (STEMI) was the most prevalent form of ACS (54.9%), followed by NSTEMI (27.4%) and unstable angina (17.7%). Similar preponderance of STEMI had been documented in earlier Indian research. The increased incidence of STEMI in the developing nations might be related to late hospital presentation, poor preventive treatment, lack of information regarding the cardiac symptoms and restricted availability of advanced cardiac services.

The most prevalent presenting symptom was chest discomfort, occurring in all patients (100%). Sweating (69.1%) and dyspnoea (38.3%) were also prevalent clinical symptoms. Similar constellations of symptoms have been documented in other registries of ACS. Ischaemic chest pain is the classical sign of ACS however atypical presentations may be seen especially in older people and diabetics.

In this study, the most prevalent therapeutic method used was percutaneous coronary intervention (PCI), which was performed in 34.9% of patients, whereas thrombolysis was given in 32.6% of instances. Medical treatment alone was performed in 27.4% of patients. Similar observations were noted in the Kerala ACS registry where thrombolysis and PCI were the generally used therapy methods. The comparatively lower frequency of primary PCI in many Indian locations may be owing to delayed presentation, financial restrictions and restricted availability of catheterisation facilities in peripheral health care settings.

In-hospital problems occurred in some patients. The most frequent consequence was arrhythmia (16.6%), followed by heart failure (12.0%) and cardiogenic shock (8.0%). Similar findings were observed by

Xavier et al. who described arrhythmias and cardiac failure as prevalent consequences in individuals with ACS. These problems are often linked to increased infarct size, delayed reperfusion, and reduced ventricular function. Echocardiographic assessment in this study demonstrated degrees of LV dysfunction with moderate-to-severe dysfunction in around one-third of patients. STEMI patients had inferior outcomes compared to NSTEMI and unstable angina cases with statistical significance ($p=0.041$). Similar observations have been observed in prior investigations in which STEMI patients had greater morbidity and death from severe myocardial injury [16].

In the present investigation, most patients were released in stable condition (89.1%) while in-hospital death was found in 6.3% of the patients. Similar observations have been seen in earlier Indian registries reporting 5-8% mortality among hospitalised patients with ACS. Favourable patient outcome of the present research may be attributed to improved pharmacological treatment, faster thrombolysis, better critical care monitoring and increased availability of PCI services.

The mean duration of hospital stay in current research was 5.8 ± 2.4 days which is consistent with previous hospital-based studies done in tertiary care facilities [17]. Longer hospital stay is often related with serious myocardial infarction, sequelae, heart failure and delayed recovery.

Killip classification still is an important prognostic predictor in individuals with ACS. In the present investigation, most patients were in Killip Class I (64.6%), which indicates reasonably stable haemodynamic presentation at admission. As a result, patients in higher Killip classes had worse outcomes and more problems, which is consistent with previous research [18].

The present study underlines that the ACS is mostly affecting middle aged males with hypertension, smoking and diabetes mellitus as important related risk factors. The most prevalent clinical feature was STEMI, and the primary therapeutic options were PCI and thrombolysis. Most patients had a favourable result but major complications and death were still seen in STEMI patients and those who presented late to hospital. In order to lessen the burden of ACS in India, early diagnosis, active risk factor modification, public awareness about cardiac symptoms and enhanced accessibility to advanced cardiac care facilities are needed.

Conclusion

The present retrospective analysis indicates that acute coronary syndrome (ACS) is still a serious cardiovascular health concern, mostly affecting middle-aged and older males. The biggest related risk factors observed in the research population were

hypertension, smoking, diabetes mellitus and dyslipidaemia. The commonest clinical manifestation was ST elevation myocardial infarction (STEMI). The commonest presenting symptom was chest discomfort.

The primary treatment options used for ACS patients were percutaneous coronary intervention and thrombolytic therapy. The majority of the patients were released in a stable state, however such like arrhythmia, heart failure and cardiogenic shock were found in a large proportion of the cases. Compared to NSTEMI and unstable angina patients, STEMI patients had somewhat worse outcomes.

The results of the present study underscore the importance of early diagnosis, timely management, good control of risk factors and increased access to advanced cardiac care facilities for lowering ACS-related morbidity and death. Public knowledge about lifestyle change, smoking cessation, hypertension and diabetes control and enhancement of emergency cardiac services may greatly improve clinical outcomes and minimise burden of ACS in the community.

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