Clinical Profile, Management and Outcomes in Patients with Acute Coronary Syndrome: An Observational Study from a Tertiary Care Hospital in Central India

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Abstract: *This study investigates the clinical and epidemiological profile of patients with acute coronary syndrome (ACS) in a tertiary care hospital in central India. Examining 802 ACS cases between January and May 2024, the study assesses patient demographics, clinical characteristics, and angiographic profiles, alongside predictors of in - hospital mortality. Findings reveal that most patients had STEMI, with hypertension and diabetes as common risk factors. Differences in disease patterns were noted between STEMI and NSTE - ACS groups, with STEMI patients experiencing higher complication rates. The study underscores India's shifting lifestyle and demographic patterns contributing to cardiovascular risks and provides critical insights for treatment approaches.*

Keywords: acute coronary syndrome, coronary artery disease, STEMI, cardiovascular risk

1. Introduction

Coronary artery disease is a common heart condition that involves atherosclerotic plaque formation in the vessel lumen. This leads to impairment in blood flow and thus oxygen delivery to the myocardium. It is a cause of major morbidity and mortality worldwide. (1). In 2022, there were 315 million (95% uncertainty interval 273 to 362) prevalent cases of CAD globally. (2)

Cardiovascular diseases (CVDs) constitute an important cause of morbidity and mortality globally, and India is no exception to this trend. The incidence of CVDs in India is not only alarming but also exhibits an upward trajectory with advancing age. Primary risk factors contributing to the elevated incidence among older adults include hypertension (HT), diabetes, dyslipidemia, obesity, smoking, a sedentary lifestyle, and poor dietary habits. (3) The burgeoning burden of CHD in India can be explained by the alarming rise in the prevalence of coronary risk factors like diabetes, hypertension, atherogenic dyslipidemia, smoking, central obesity and physical inactivity. Rapid urbanization and change in lifestyle that occurred during the past two decades have led to the growing burden of coronary risk factors in India. (4) Compared to Europeans, CVDs affect Indians at least 10 years earlier and impact them during the most productive midlife period. (5) According to the Indian Census, 2011, the number of people aged 60 years and above had reached nearly 104 million, accounting for 8.6% of the nation's total population (6). The aging process has a significant impact on the decline of cardiovascular function, which leads to a higher likelihood of developing CVDs among older adults. (7.) It is evident that India is undergoing an epidemiological as well as demographic transition. Additionally Socio - cultural and economic transitions have also played an important role in the CVD epidemic. India which was largely agrarian in nature is shifting to a more industrialized one, with previously manual tasks becoming mostly mechanized. (8) As a result of this shift, there has been a decline in physical activity and sedentary lifestyle that have become increasingly common. India has also been undergoing a nutritional transition, characterized by a decrease in intake of healthy foods such as coarse cereals, pulses, fruits and vegetables, and a corresponding increase in intake of meat products, processed and ready - to - eat energy dense and high salt foods. (9) Individual studies have reported that there are substantial regional variations in risk factors and CAD related morbidity and mortality in India. Hence this study was conducted in a tertiary care centre in central India to study the clinical, epidemiological profile, of ACS patients presenting to the institute along with their angiographic features, treatment outcomes and to evaluate predictors of in - hospital mortality.

2. Methodology

A single centre observational study was conducted in a tertiary care teaching hospital in central India among 802 consecutive cases of acute coronary syndrome (ACS) presenting to the cardiology department from January to May of 2024. All subjects were above the age of 18 and both men and women were included in the study. Ethical clearance from the institutional ethical committee was obtained before commencing the study and ethical guidelines and standards outlined in the Declaration of Helsinki were observed. Patients having concomitant valvular heart disease, cardiomyopathy, pericardial disease, congenital heart disease and patients who refused to consent for the study were excluded from the study. Socio - demographic and clinical details of the patients were extracted from their medical files. Two dimensional echocardiography was done to assess the left ventricular (LV) ejection fraction and associated mechanical complications. Acute myocardial infarction was defined as

per the third universal definition of myocardial infarction. (10) Non ST segment elevation myocardial infarction (NSTEMI) /Unstable angina (UA) was defined as per 2014 American Heart Association (AHA) /American college of cardiology (ACC) non ST elevation - acute coronary syndrome (NSTE - ACS) guidelines. (11)

The angiographic profiles were analyzed by two interventional cardiologists, who were blinded to patient outcomes to minimise bias. Significance of lesions was estimated visually. More than 70% stenosis of left anterior descending (LAD), right coronary artery (RCA), left circumflex artery (LCX), and more than 50% stenosis of the left main coronary artery (LMCA) was considered significant. All cases were managed by senior cardiologists in accordance to the institute policies based to the recommendation of the AHA guidelines. Primary PCI for the cases presenting in the window period and consenting to the procedure. Patients were monitored throughout the duration of hospitalization to assess for clinical outcomes.

Data was collected, sorted and compiled in MS Excel. Data was presented in graphical and tabular formats. Frequencies and proportions were calculated. Means and standard deviation were calculated for continuous variables. Chi – square test was used to compare categorical variables and unpaired t - test was used to compare means of continuous variables. All statistical tests were performed using the trial version of Statistical package for social sciences (SPSS Inc., version 23.0™; IBM corporation, Chicago, USA). A p - value of less than 0.05 was considered to be statistically significant.

3. Results

A total of 802 eligible patients admitted with ACS were enrolled in the study. Majority of the patients were men (64.09%). Overall mean age was 58.76 ± 2.4 years. Majority of the patients had STEMI (584/802, 60.34 %), whereas 218 (27.18 %) were NSTE - ACS patients. It was observed that STEMI was more common in females as compared to males whereas NSTE - ACS was commoner in males, and this difference was statistically significant ($p<0.05$). Hypertension was the most common risk factor being present in 486 (60.60%) of the patient population. It was significantly more common in STEMI patients than in NSTE - ACS and this difference was statistically significant ($p<0.05$). Diabetes was present in 411 (51.25%) of the patients being more common in STEMI patients than in NSTE - ACS. Dyslipidemia was seen in 381 (47.51%) of the patients without any significant difference between STEMI and NSTE - ACS groups. Past history of IHD was more commonly present in STEMI cases as compared to NSTE - ACS group and this difference was highly significant ($p< 0.01$) (Table1)

Table 1: Clinical characteristics and risk factor profile of the study population

Variable		All ACS CASES (802)	STEMI (584)	NSTE - ACS (218)	p value
Age		58.76±2.4	56.76±3.1	57.43±7.3	0.06
Sex	Male	514 (64.09)	356 (69.26)	158 (30.74)	0.02
	Female	288 (35.91)	228 (79.17)	60 (20.83)	
Hypertension	Present	486 (60.60)	405 (83.33)	81 (16.67)	<0.01
	Absent	316 (39.40)	179 (56.65)	137 (43.35)	
Diabetes	Present	411 (51.25)	310 (75.43)	101 (24.57)	0.08
	Absent	391 (48.75)	274 (70.08)	117 (29.92)	
Dyslipidemia	Present	381 (47.51)	270 (70.87)	111 (29.13)	0.2
	Absent	421 (52.49)	314 (74.58)	107 (25.42)	
H/O IHD	Present	651 (81.17)	492 (75.58)	159 (24.42)	0.002
	Absent	151 (18.83)	92 (60.93)	59 (39.07)	

Table 2: Angiographic profile of the study population

Parameter		All ACS CASES (802)	STEMI (584)	NSTE - ACS (218)	P value
CAG Performed		650 (81.04)	491 (84.07)	166 (76.14)	
	Insignificant CAD	110 (16.92%)	79 (16.09%)	31 (14.22%)	<0.01
	SVD	280 (43.08%)	246 (50.10 %)	53 (24.31%)	
	DVD	137 (21.08%)	108 (22%)	27 (12.39%)	
	TVD	123 (18.92%)	58 (11.81%)	55 (25.23%)	
Vessel involvement	LM	25 (3.85%)	6 (1.22%)	13 (5.96%)	<0.01
	LAD	409 (62.92%)	295 (60.08%)	113 (51.83%)	
	LCX	208 (32%)	152 (30.96%)	56 (25.69%)	
	RCA	260 (40%)	191 (38.90%)	71 (32.57%)	

Table 2 shows the angiographic profile of study participants. Out of 802 patients, 153 (19.07 %) were managed noninvasively and 650 (81.04%) were subjected to selective coronary angiography within 24 h of admission. Most commons reasons for non - invasive management were deranged renal parameters, unwillingness of the patient, severe co - morbidities limiting life expectancy, or moribund state. Normal epicardial coronaries or insignificant CAD was seen in 110 (16.92%) of the patients. Single vessel disease was the most common pattern of coronary involvement and was seen in 280 (43.08%) of the patients. It was more common in STEMI subgroup (50.10% vs.24.31%). Double vessel disease was seen in 137 (21.08%) of the patients. Triple vessel disease was seen in 123 (18.92%) of the patients. Left main coronary artery (LM) involvement was seen in 25 (3.85%) of the patient population. It was more common in NSTE - ACS population (5.96% vs.1.22%). The LAD was the most commonly

involved vessel with significant stenosis being present in 409 (62.92%) of the overall ACS population. The

angiographic findings varied significantly among STEMI and NSTE - ACS cases. (p<0.05)

Table 3: Management strategies in the study population

Parameter		All ACS CASES (802)	STEMI (584)	NSTE - ACS (218)	P value
Treatment	PCI	281 (35.04%)	216 (36.99%)	65 (29.82)	<0.01
	POBA	249 (31.05%)	163 (31.05%)	86 (39.45%)	
	CABG	120 (14.96%)	88 (14.96%)	32 (14.68%)	
	Thrombolysis	80 (9.98%)	70 (9.98%)	10 (4.59 %)	
	Thrombus Aspiration	72 (8.98%)	47 (8.98%)	25 (11.47%)	
Complications	Composite MACE	156 (19.45%)	140 (23.97%)	16 (7.3%)	<0.01
In hospital mortality		10 (1.2%)	6 (1.02%)	4 (1.8%)	0.8

Table 3 shows the management strategies employed for the study subjects. The commonest intervention was PCI (281/802 i, e 35.04 %), plain old balloon angioplasty was done in 31.05 % cases, CABG in 14.96% cases, thrombolysis in 9.98 % cases and thrombus aspiration in 8.98 % of total ACS cases. The commonest intervention in STEMI was PCI whereas in NSTE - ACS group it was POBA (plain old balloon angioplasty). Major adverse cardiovascular events (MACE) recorded in this study included in - hospital mortality, heart failure, cardiogenic shock, cardiac arrest, re - infarction, stroke, and major bleeding. Complication rates were significantly higher in STEMI cases as compared to NSTE - ACS group (p<0.05). The overall mortality in ACS patients was 1.2 %. The mortality rate was higher in NSTE - ACS group as compared to STEMI however this difference was not statistically significant.

4. Discussion

A single centre observational study was conducted among 802 cases of acute coronary syndrome presenting to the department of cardiology of a tertiary care teaching hospital in central India. Overall mean age of al ACS cases 58.76±2.4 years. Majority of the patients had STEMI (584/802, 60.34 %), whereas 218 (27.18 %) were NSTE - ACS patients. It was observed that STEMI was more common in females as compared to males whereas NSTE - ACS was commoner in males, and this difference was statistically significant (*p*<0.05). A similar study by Elbarbary M et. al has corroborated these findings. (12) Hypertension was the most common risk factor being present in 486 (60.60%) of all ACS cases. It was significantly more common in STEMI patients than in NSTE - ACS and this difference was statistically significant (*p*<0.05). However Konstantinou K et al. in their 2019 study reported that hypertension was commoner in NSTEMI cases as compared to in STEMI patients. (13).

Single vessel disease was the most common pattern of coronary involvement and was seen in 280 (43.08%) of the patients. It was more common in STEMI subgroup (50.10% vs.24.31%). Left main coronary artery (LM) involvement was seen in 25 (3.85%) of the patient population. It was more common in NSTE - ACS population (5.96% vs.1.22%). The LAD was the most commonly involved vessel with significant stenosis being present in 409 (62.92%) of the overall ACS population. The angiographic findings varied significantly among STEMI and NSTE - ACS cases. Sidhu NS et al. studied the clinical

characteristics in a cohort of ACS cases also reported similar findings in their study. (14)

We found that complication rates were significantly higher in STEMI cases as compared to NSTE - ACS group in our study. The overall mortality in ACS patients in the current study was 1.2 %. We found that the mortality rate was higher in NSTE - ACS group as compared to STEMI, however this difference was not statistically significant. Y. P. Sharma, K. Santosh Vemuri, D. Bootla et al. in their found that the in - hospital mortality rate were 8.9% in STEMI patients, while comparatively lower rates were observed in NSTE - ACS (4.5%). They also reported that non - fatal MACE (major adverse cardiovascular outcomes) such as stroke, heart failure, or cardiogenic shock were more common in STEMI group. (15)

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