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Original article

Assessment of Demographics, Management and Outcomes of Acute Coronary Syndrome in Rural Population of India

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ABSTRACT

Introduction: Acute coronary syndrome (ACS) comprise the majority of hospital admissions and encompass a high risk of in-hospital mortality. This study aimed to understand and assess the characteristics of hospitalized ACS patients, trends in their management as per evidence based medicine, and its impact on outcome. **Materials & Methods:** This was a prospective, observational study conducted at a tertiary care hospital in India during January 2018 to December 2018. All consecutive patients suspected of ACS having age ≥ 18 years were admitted. During hospitalization, a case report form was filled out for patients with diagnosis of ACS. It included data on demographic, clinical and electrocardiographic characteristics of the patients, diagnosis & treatment modalities. Treatment outcome was mentioned in terms of TIMI grading & in hospital complications. **Results:** A total of 112 consecutive patients admitted in cardiac ICU were enrolled. Out of them 72 (64.28%) were males and 40 (35.72%) were females. Mean age of study cohort was 55.98±10.68 years. Most commonly associated conventional risk factors were Hypertension and diabetes [65 (58.04%) hypertensives and 33 (29.46%) diabetics]. Medical management was offered to 78 (69.64%) whereas, 34 (30.36%) underwent PTCA or CABG. TIMI flow grading assessment done in 62 patients of which 1/3rd patients showed TIMI grade 3.**Conclusion:** The present study showed higher ACS prevalence among patients who were in sixth to seventh decade of life, most commonly males, and associated with conventional risk factors, hypertension and diabetes.

KEYWORDS:Acute Coronary Syndrome, Demographic, Outcome, Rural, TIMI grade

INTRODUCTION

Acute coronary syndromes (ACS) represent a challenging and demanding global health problem. ACS comprise the majority of all acute medical admissions and encompass a high risk of in-hospital morbidity and mortality. Despite significant improvement in mortality data through the enhancement of treatment modalities in recent years, patients with ACS remain at high risk of recurrent ischemic events and death [1].

India is enduring a rapid health transition by way of rising burden of coronary heart disease (CHD). Among adults over 20 year of age, the estimated prevalence of CHD is around 3-4% in rural areas and 8-10 per cent in urban areas, representing a two-fold rise in rural areas and a six-fold rise in urban areas between the years 1960 and 2000 [2]. To improve the understanding of ACS patient's characteristics and to incorporate evidence based medicine in their treatment and to gather information on long term outcome in these patients, up to date data on ACS cases is required in India [3].

Numerous epidemiological studies from Asian countries have led to insights regarding the prevalence, treatment and prognosis of ACS. Few studies have indicated geographic differences, the prevalence of cardiovascular risk factors and heterogeneity in the care and prognosis of patients with ACS across India. Yet it is difficult to get a comprehensive picture of the epidemiology and disease burden of coronary artery disease (CAD) in India.

In this study we assessed the characteristics of hospitalized ACS patients, trends in management of ACS patients, and their impact on outcome.

MATERIALS AND METHODS

The study was a prospective, observational study conducted at Acharya VinobhaBhave Rural Hospital (AVBRH), SawangiWardha in India. The study was conducted from January 2018 to December 2018. All consecutive patients suspected of ACS having age ≥ 18 years admitted for chest pain or pressure, at rest or on exertion, radiating to jaw or neck up to occipital region, shoulder or arm pain with shortness of breath and nausea, vomiting were included. Patients diagnosed with atypical chest pain and patients or relative who did not give written consent were excluded from the present study. All patients were informed using patient information sheet and signed a written informed consent.

During hospitalization, a case report form was filled out for patients with diagnosis of ACS. The case report included data on demographic (age, gender, height, weight, educational level, marital and employment status), clinical and electrocardiographic characteristics of the patients. Data collected on past medical cardiovascular and non-cardiovascular history and the prevalence of the following cardiovascular risk factors: hypertension (blood pressure ≥140/90 mmHg or treatment with antihypertensive agents), dyslipidaemia (total cholesterol ≥190 mg/dL or treatment with hypolipidemic medications), diabetes mellitus, smoking status (history of smoking was established in current or ex-smokers), and alcohol status.

The case report included diagnostic and treatment modalities, treatment outcome in terms of TIMI grading & in hospital complications. Baseline ECG was obtained at admission and repeated at 12 -24 hours and every 24 hours thereafter. A 2D Echocardiogram was performed within initial 48-72 hours for analysis of left ventricular function and wall motion abnormalities. The benefits of reperfusion therapy were recognized by the prompt re-establishment of normal blood flow through the infarct-related artery, called as thrombolysis in myocardial infarction (TIMI) 3 flow [4]. Outcome assessment was done using TIMI flow grading as mentioned below,

Grade 0: No antegrade flow beyond the point of occlusion

Grade 1: Minimal incomplete perfusion of contrast medium around the clot

Grade 2 (partial perfusion): Complete but delayed perfusion of the distal coronary bed with contrast material

Grade 3 (complete perfusion): Antegrade flow to the entire distal bed at a normal rate

The data analysis was performed using online statistical software, frequency distribution and cross tabulation was used to prepare the tables. Quantitative data is expressed as mean± SD whereas categorical data is expressed as percentage. Significance level was assessed at 5% level.

RESULTS

A total of 112 consecutive patients admitted in cardiac ICU were enrolled. Out of them 72 (64.28%) were males and 40 (35.72%) were females. Mean age of study cohort was 55.98±10.68 years. 65 (58.04%) patients were hypertensive, 33 (29.46%) patients were diabetic, 02 (1.79%) patients had dyslipidaemia, 02 patients reported smoking & alcohol addiction. Of these 86 patients underwent CAG, of which 32 (37.21%) patients had atypical chest pain or normal coronaries as final diagnosis, leaving 54 eligible patients with CAD for the further analysis.

Table 1: Demographic profile

Variable (N=112)	Mean± SD*/ N†	Percentage (%)
1. Age	55.98± 10.68	
2. Gender: Male	72	64.28
Female	40	35.72
3. Risk Factors		
a. Hypertension	65	58.04
b. Diabetes Mellitus	33	29.46
c. Smoking	01	0.89
d. Alcohol Abuse	01	0.89
e. Dyslipidaemia	02	1.79

*SD: Standard Deviation; †N: Number of patients

Total 16 (18.60%) of all patients with CAD had single vessel disease (SVD), 21 (24.42%) patients had double vessel disease (DVD) and 17 (19.77%) patients had triple vessel disease (TVD) on CAG. More than 50% patients with SVD and around 75% patients with DVD recorded hypertension. A 2D Echocardiogram revealed that 72 patients had normal left ventricular function, while around 30% patients showed mild to moderate left ventricular dysfunction. Out of 112 patients, 78 (69.64%) were medically managed (thrombolysis with antiplatelets / heparin with antiplatelets depending upon the time of

presentation and the type of ACS) whereas, 34 (30.36%) underwent PTCA or CABG.

After medical or percutaneous intervention management, outcome assessment was done using TIMI flow grading in 62 patients only (since 18 patients who had CABG done we could not assess TIMI flow and we lost data of 6 patients). Out of them one third patients showed TIMI grade 3.

Table 2: Key Investigations done among study subjects

Variable (N=112)	**N**	**Percentage (%)**
1. 2DECHO – LVEF‡		
Normal	72	64.29
Hyper dynamic	01	0.89
Mild Left Ventricular Dysfunction	17	15.18
Moderate Left Ventricular Dysfunction	16	14.29
Severe Left Ventricular Dysfunction	05	4.46
Unknown	01	0.89
2. Coronary Angiography (N= 86)		
a. Normal	32	37.21
b. Disease		
Single vessel disease	16	18.60
Double vessel disease	21	24.42
Triple vessel disease	17	19.77

‡LVEF: Left ventricular ejection fraction

Safety analysis: during first follow up after 7 days most of the patients who underwent PTCA & CABG were uneventful. Medically managed patients were discharged on 7th day. After PTCA 3 patients required post-operative ionotropic support. Local hematoma at femoral site was observed in 2 patients and 3 patients showed mild allergic reaction to dye.

Table3: Treatment Offered & Outcome in terms of TIMI flow

Variable	**N**	**Percentage (%)**
Treatment Offered (N=112)		
1. PTCA§	16	14.29
2. CABG ‖	18	16.07
3. Medical Management	78	69.64
Outcome (N=62)		
TIMI¶ Flow – 0	15	24.19
1	10	16.13
2	16	25.81
3	21	33.87

§PTCA: Percutaneous coronary intervention; ‖CABG: Coronary artery bypass graft; ¶TIMI: Thrombolysis in Myocardial Infarction

DISCUSSION

ACS is a significant contributor to morbidity and mortality attributed to cardio-vascular diseases, both in developed and developing countries. The syndrome encompassing ST segment elevation myocardial infarction, non ST segment elevation myocardial infarction and unstable angina, are common causes of emergency hospital admission [5].India is proposed to bear the greatest burden of non-communicable diseases and it is clearly evident from the fact that burden of cardiovascular diseases have reached epidemic proportions in Indian population [6,7].

The epidemiological studies from different parts of India have noted rising trends. These studies also reported great burden in the planes of conventional risk factors for CHD including hypertension and diabetes [8,9]. Epidemiological studies have revealed that present health transition from predominance for infections to the preponderance for cardiovascular disorders, such as CAD, hypertension, diabetes and dyslipidaemia is now accountable for 53% of all deaths. The disease inclined to be more aggressive and manifests on a younger age. Newer epidemiological studies in India have reported that some of the patients presenting with ACS might not have any risk factor for CAD [10].

In the present study the mean age of presentation was 55.98± 10.68 years (range 32 to 75 years) which is comparable to data from the CREATE Registry (mean age 57±12.1 years). The maximum number (about 38%) of patients was in the age group of 55 to 65 years [11].

In this study we found that STEMI was more common in males (around 64%) than females (around 35%). Few studies have revealed higher prevalence of ACS in age 60 years or older, also predominantly in males which is in consistent with the result obtained in present study [12]. The skewed gender distribution bias was a key factor in INTERHEART study, correspondingly its South Asian cohort [13]. The male population in CREATE Registry and another study from North India was, 76.4% & 83.3% respectively.

A conventional risk factor, Hypertension is implicated in CAD. In the present study, 58% of patients were hypertensive. The prevalence of hypertension is greater to that showed in CREATE registry (37.7%), and also steep higher than that proclaimed in south Asian cohort of INTERHEART study (17.8%). Second most common risk factor in the present study was diabetes (29%). Earlier studies recorded prevalence of diabetes between 5 to 20% in patients with CAD [14,15] which was comparable to our findings. Bhavik S. Shah et al. reported higher prevalence in their study, showing that one-third of total patients (260 out of 960) admitted with CAD had diabetes [16].

Overall the greater prevalence of hypertension and diabetes as reported in recent studies may be accounted for the comparatively advanced development[13] and raising prevalence of risk factors for epidemic of CAD in India. Coexistence of hypertension and diabetes, which is commonly observed in CAD patients, likewise seen in the present study, is significant multiplicative risk factor for micro- and macro-vascular diseases, ensuing increased morbidity and mortality [17]. The worse prognosis of CAD patients with ACS in India, as mentioned in CREATE registry, at least in part, could be associated to clustering of various conventional risk factors [11].

Over the past certain years, a substantial advancement has been noticed in the management of ACS patients. The key element of treatment in patients with STEMI is the well-timed implementation of reperfusion therapy, either by PCI or fibrinolysis, whereas in NSTEMI/UA patients an earlier invasive strategy has been recommended. In the HELIOS study, [18] 9% underwent primary PCI, 50% received fibrinolysis and 41% did not receive reperfusion therapy, whereas in the more recent Stent For Life study, [19] 32% patients underwent primary PCI, 40% patients underwent fibrinolysis and 28% patients did not receive reperfusion therapy.

Likewise, we have shown somewhat better percentages for the management of STEMI patients with around 30% undergoing primary PCI and around 70% undergoing medical management (fibrinolysis), implying an improvement in the management of STEMI patients. Though, an important reason for no reperfusion therapy remains delayed hospital admissions and non-availability of primary PCI, requiring the improvement of the infrastructure as well as participation of PCI networks in a nationwide scale.

The current study has few limitations like small sample size and descriptive nature was the main limitation; a large randomized clinical study is desired to strengthen the presents study findings.

CONCLUSION

The present study was a prospective observational study that illustrated, demographic profile, the management and the outcome of ACS patient's in rural population of India. ACS prevalence was higher among patients who were in sixth to seventh decade of life, most commonly males, and associated with conventional risk factors, hypertension and diabetes. Hypertension showed greater prevalence among patients with STEMI.

Extensive research over the last certain years lead to better understanding of and compliance to several management strategies, such as the timely use of invasive management as well as fibrinolytic, which has brought about significant improvements in the outcome of ACS patients, regardless of the lack of improvement in the cardiovascular profile. Nonetheless, considerable extent for improvement still available, and many challenges required to be addressed for the improvement of prognosis in rural population of India.

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Competing interest: The authors declare that they have no competing interests.

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