Clinical profile of patients presenting with acute coronary syndromes at tertiary healthcare hospital in Northern Maharashtra

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ABSTRACT

Background: ST-elevation myocardial infarction (MI) in very young patients has devastating consequences and causes a huge loss to the economy and productivity. However, data regarding demographic, clinical, and angiographic profile of this population are lacking in India as also in the western literature and characteristics of presentation with acute MI (AMI) in very young patients who have been inadequately studied. **Aims and Objectives:** The aims of this study were to assess the demographic, clinical, echocardiographic, and angiographic profile and risk factor pattern of patients with acute coronary symptoms at our tertiary healthcare providing hospital in Northern Maharashtra. **Materials and Methods:** It was a descriptive comparative study with longitudinal design that was carried out from January 2021 to December 2021 (1 year) in the emergency room and out-patient department of our tertiary healthcare providing hospital in Northern Maharashtra, conducted among 206 consecutive patients aged ≥18 years suspected to have AMI. **Results:** Among examinations and diagnostic workup, majority of the study subjects were diagnosed as ST elevation acute coronary syndromes (ACSs) (76.69%), out of which majority had anterior wall myocardial infarction (AWMI) (45.63%), followed by inferior wall MI (26.7%), lateral wall MI (4.37%). About 23.3% study subjects had non-ST elevation types of ACSs. **Conclusions:** The conventional risk factors are highly prevalent even among young patients with coronary artery disease. Despite all the recent advances, delayed presentation in ACS is unfortunately widespread. AWMI is more common, most of the patients have a single-vessel disease, and in-hospital mortality is low in this young population.

Key words: Acute coronary syndrome; Acute myocardial infarction; Cardiovascular diseases; Risk factors

INTRODUCTION

Cardiovascular disease (CVD) is the leading cause of death globally[1] and causes 12 million deaths throughout the world each year, in accordance with the third monitoring report of the World Health Organization.[2] CVD is the leading cause of death in India, with coronary artery disease (CAD) accounting for a majority of the deaths.[1,2] Based on the treatment and outcomes of acute coronary syndromes (ACSs) in India (CREATE) registry[3] published in 2008, the mean age of presentation with an ACSs was 57.5 years, which is 7–11 years younger than reports from the Western literature.

Conventionally, CAD is considered to be a disease of the elderly. The cutoff age of 45 years has been used in most studies to define "young" patients with CAD or an acute myocardial infarction (AMI).[4] The patient subgroups ≤35 years with CAD are at times referred to as "very young"[5] CAD in the very young that was found in only 1.5% of all patients with CAD.[6] Clinical observation suggests that CAD in the very young is increasing in India. Many very young

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patients in India present with none or a single risk factor.[7] Stable angina is uncommon, and the first presentation of CAD in the very young is usually a fully evolved myocardial infarction (MI).[8] The presentation with an AMI in the very young shows a different clinical, angiographic, and pathophysiological profile compared with the older cohorts.[9] As classic coronary atherosclerotic plaque rupture is not common during the early decades of life, uncommon etiologies may be considered.[9] The limited angiographic data available seems to suggest a higher prevalence of single vessel CAD and less of multi-vessel CAD in the very young.[10]

The CREATE registry has previously reported that patients with ST elevation MI (STEMI) took a much longer time to reach the hospital, and hence, fewer patients received definitive treatment for MI in India compared with developed countries. All-cause mortality was higher in Indian patients, and more so in patients with poor socioeconomic status.[3]

STEMI in very young patients has devastating consequences and causes a huge loss to the economy and productivity. However, data regarding demographic, clinical, and angiographic profile of this population are lacking in India as also in the western literature and characteristics of presentation with AMI in very young patients who have been inadequately studied.[11]

Aims and objectives

The objective of our study was to assess the demographic, clinical, echocardiographic, and angiographic profile and risk factor pattern of patients with acute coronary symptoms at our tertiary healthcare providing hospital in Northern Maharashtra.

MATERIALS AND METHODS

Study population

It was a descriptive comparative study with longitudinal design was carried out from January 2021 to December 2021 (1 year) in the emergency room (ER) and out-patient department of our tertiary healthcare providing hospital in Northern Maharashtra.

A total of 206 consecutive patients aged ≥18 years suspected to have AMI during our study period were included in our study. Patients suspected to have myocarditis (diagnosed clinically by history of (h/o) viral prodrome, h/o fever preceding for days to weeks, atypical or non-anginal chest pain, and global hypokinesia on echocardiography) were excluded from our study.

Ethical approval

The ethical approval was obtained from the Institutional Ethical Committee before the start of the study (Institutional Ethical Committee approval letter number 021/2021, dated January 11, 2021). Patient's informed consent was taken before enrolling them in the present study.

Data collection

MI was diagnosed in accordance with the Third Universal Definition of MI. Patient's history was documented in detail and brief focused that clinical examination was performed. The current smoking was defined as a personal h/o smoking in the past 12 months. Family h/o CAD was defined as a h/o ischemic heart disease in first-degree relatives (men <55 years of age or women <65 years of age). The chain of events from symptom onset to arrival in ER was serially recorded. Socioeconomic status categorization was carried out in accordance with the updated B G Prasad socioeconomic classification 2014.

Two-dimensional echocardiography was performed in all of the study subjects before thrombolysis or percutaneous coronary intervention (PCI) using the Philips SONOS 5500 machine. Invasive coronary angiography (CAG) through femoral arterial access was performed in most of the patients either as a part of the primary/rescue PCI or before discharge if the patient was already thrombolyzed or managed conservatively.

Data regarding thrombolysis in MI flow characteristics, presence of calcium, and presence of thrombus were recorded. Obstructive CAD was considered to be present if ≥75% diameter stenosis was present on visual assessment in one of the major epicardial coronary arteries. Multi-vessel disease was defined as ≥50% stenosis of ≥2 major epicardial coronary arteries. Patients were treated in accordance with the latest MI management guidelines. Routine blood investigations were performed at the time of admission.

Statistical analysis

The data were recorded with the help of standard, semi-structured, and pre-validated case record pro forma. Informed consent was obtained from all subjects as per the existing norms of the Institutional Ethics Committee.

Continuous variables were expressed as mean and standard deviation, whereas categorical variables were expressed as numbers and percentages. Continuous variables were compared between cases and controls using an unpaired t-test and categorical variables using Chi-squared or Fisher's exact test. Statistical tests were performed using the Statistical Package for the Social Sciences 20 and a two-sided P≤0.05 was considered statistically significant.

RESULTS

Demographic parameters

In the present study, the mean age of the study participants was 46.67±12.3 years. About 61.17% were male, while 38.83% were female (male preponderance). Majority of the subjects belonged to the middle socioeconomic class (50%), followed by upper class (27.18%), and lower class (22.82%). About 77.67% subjects belonged to the urban geographic area, while 22.33% were from rural areas (Table 1).

Comorbidities and personal history

In this study, we observed that 13.59% had diabetes mellitus, 18.93% had hypertension, and 10.19% had pre-existing CVD. When their personal history was assessed, 19.9% were smokers, 17.48% were tobacco chewers, and 23.9% were alcohol users. About 16.99% had family history of CVD (Table 2).

Clinical presentation

In the present study, we observed their clinical presentation. Majority of the subjects presented with angina (91.26%),

Table 1: Demographic parameters

Demographic parameters	Number of subjects	Percentage
Age distribution		
<30 years	17	8.25
31–40 years	38	18.45
41–50 years	51	24.76
51–60 years	58	28.16
More than 60 years	42	20.39
Gender-wise distribution		
Males	126	61.17
Females	80	38.83
SES		
Upper	56	27.18
Middle	103	50.00
Lower	47	22.82
Residence		
Urban	160	77.67
Rural	46	22.33

SES: Socioeconomic status

Table 2: Comorbidities and personal history

Comorbidity and personal history	Number of subjects	Percentage
Comorbidities		
Diabetes mellitus	28	13.59
Hypertension	39	18.93
CVD	21	10.19
Personal history		
Smokers	41	19.90
Tobacco users	36	17.48
Family history of CVD	35	16.99
Alcohol user	48	23.30

CVD: Cardiovascular disease

followed by dyspnea among 12.62%, and atypical chest pain among 10.19% study subjects (Figure 1).

ACS types

Among examinations and diagnostic workup, majority of the study subjects were diagnosed as ST elevation ACSs (76.69%), out of which majority had anterior wall myocardial infarction (AWMI) (45.63%), followed by inferior wall MI (IWMI) (26.7%) and lateral wall MI (LWMI) (4.37%). About 23.3% study subjects had non-ST elevation types of ACSs (Table 3).

Management and outcomes

In this study, 86.89% subjects underwent CAG. About 65.53% study subjects were managed with thrombolysis, 62.62% underwent PCI procedure, while CABG was performed among 13.11% study subjects. In our hospital, we observed mortality of 3.4%, while 96.6% were cured and discharged (Table 4).

DISCUSSION

There are very few registries in India that provide data on the young population's prevalence and profile with CAD. The first registry in India, which published data on the young CAD population, was the CADY registry. In a retrospective study of 8,268 patients with ACS from South India, approximately 10% were <40 years of age. Young patients with CAD are almost always males, as reported in many studies. Diabetes mellitus and systemic hypertension are well-known risk factors for CAD in the young population, which were evident in our study. In the present study, the mean age of the study participants was 46.67±12.3 years.

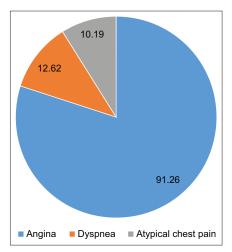The CREATE registry[12] also had a male preponderance with 81.5% of patients with STEMI being male. Similarly,

Figure 1: Clinical presentation

Legend: Angina 91.26, Dyspnea 12.62, Atypical chest pain 10.19

Table 3: ACS types

ACS types	Number of subjects	Percentage
STE-ACS		
AWMI	94	45.63
IWMI	55	26.70
LWMI	9	4.37
NSTE-ACS	48	23.30
Total	206	100.00

STE-ACS: ST-segment elevation acute coronary syndrome, LWMI: Lateral wall myocardial infarction, IWMI: Inferior wall myocardial infarction, AWMI: Anterior wall myocardial infarction

Table 4: Management and outcomes

Management and outcomes	Number of subjects	Percentage
Management		
Coronary angiography	179	86.89
Thrombolysis	135	65.53
PCI	129	62.62
CABG	27	13.11
Outcome		
Discharged	199	96.60
Mortality	7	3.40
Total	206	100.00

PCI: Percutaneous coronary intervention, CABG: Coronary artery bypass graft

the Kerala ACS registry[13] also had a male preponderance with 77.5% of patients with STEMI being males. Females in this age group are usually protected from CAD. Other important reasons for the under representation of females might be the underutilization of health-care services in the society for female patients.

About 61.17% were male, while 38.83% were female (male preponderance). Majority of the subjects belonged to the middle socioeconomic class (50%), followed by upper class (27.18%), and lower class (22.82%). About 77.67% subjects belonged to the urban geographic area, while 22.33% were from rural areas. In the CREATE registry, three-fourth of the patients were also from the lower middle and poor socioeconomic status.[14] The reasons might include unhealthy food habits, addictions such that to tobacco and psychosocial stress which are more prevalent in the middle and lower socioeconomic class. Urban and semi-urban populations were predominant in the present study, as well as in the CREATE registry. The main reason for this might be better access to health care for urban and semi-urban population and also a higher incidence of CAD among the urban population due to unhealthy food and lifestyle. Rural population might be under represented in the studies due to negligence and misinterpretation of the symptoms and also due lack of health-care facilities around the clock and a weak referral system including a lack of transportation facilities.

In this study, we observed that 13.59% had diabetes mellitus, 18.93% had hypertension, and 10.19% had pre-existing CVD. When their personal history was assessed, 19.9% were smokers, 17.48% were tobacco chewers, and 23.9% were alcohol users. About 16.99% had family history of CVD. The proportions of DM and HTN among the cases were comparable with other studies. The previous studies have shown mixed results regarding the presence of a significant family h/o CAD. In the CREATE registry, where 60.6% patients presented with STEMI, 26.9% patients were known diabetics, and 31.4% patients were known hypertensive which is significantly different from the risk factor profile of our very young MI group. Almost 44.7% patients in the STEMI subgroup of CREATE registry were current or past smoker,[3] whereas the percentage was higher in our study indicating that the prevalence of smoking has increased or it may be more prevalent in this part of the country. The rates of DM, HTN, and smoking in Kerala ACS registry were 34%, 55%, and 36%, respectively.[12,13]

Patients with a history of premature CAD in their families have increased plaque content in their coronaries. The studies from India show a wide variation in the prevalence of a family history of premature CAD, which varies from very low to up to 47%. Smoking was the most common risk factor for ACS in the young population, similar to other studies. Our study found a very high prevalence of alcohol dependence (51.8%) among the study participants, which shows an alarming rise in alcohol consumption among young individuals.

In the present study, we observed their clinical presentation. Majority of the subjects presented with angina (91.26%), followed by dyspnea among 12.62%, and atypical chest pain among 10.19% study subjects. Among examinations and diagnostic workup, majority of the study subjects were diagnosed as ST elevation ACSs (76.69%), out of which majority had AWMI (45.63%), followed by IWMI (26.7%), and LWMI (4.37%). About 23.3% study subjects had non-ST elevation types of ACSs. Revaiah et al., in their study observed that the most common diagnosis was AWMI (58%) followed by IWMI (23%) and NSTE-ACS (18%), which was similar to prior studies in young ACS patients.[15]

In this study, 86.89% subjects underwent CAG. About 65.53% study subjects were managed with thrombolysis, 62.62% underwent PCI procedure, while CABG was performed among 13.11% study subjects. In our hospital, we observed mortality of 3.4%, while 96.6% were cured and discharged.

Study	Age cut-off (Years)	Males (%)	STE-ACS versus NSTE-ACS (%)	Thrombo-lysis (%)	CAG/PCI (%)	In-hospital mortality (%)
Bhardwaj et al.,[16] (n=124), 2014	40	99	95 versus 6	32	100 versus NA	1.6
Prajapati et al.,[17] (n=100), 2015	40	96	85 versus 15	NA	100 versus NA	NA
Deora et al.,[18] (n=820), 2016	40	93	75 versus 26	NA	100 versus NA	NA
Sinha et al.,[19] (n=1116), 2017	30	95	100 STE-ACS	55.5	95 versus 55	2.9
Deshmukh et al.,[11] (n=41), 2019	30	95	100 STE-ACS	61	100 versus 56	2.4
Gupta et al.,[9] (n=102), 2020	35	97	91 versus 8.8	32.3	95 versus 37	2.9
Present study (n=206)	46.67	96	82 versus 18	42.3	92 versus 54	–

CAG: Coronary angiography, PCI: Percutaneous coronary intervention, STE-ACS: ST-elevation acute coronary syndromes, NSTE-ACS: Non-ST-elevation acute coronary syndromes

Limitations of the study

The study is a cross-sectional one without a control group; therefore, each factor's risk and statistical significance could not be analyzed. Risk predictors like lipid profile data were not available in all patients. Intravascular imaging could have accurately demonstrated the underlying cause for CAD (atherosclerotic vs. non-atherosclerotic) in these young patients, especially in patients with MINOCA and patients with non-obstructive coronaries.

CONCLUSIONS

The conventional risk factors are highly prevalent even among young patients with CAD. Despite all the recent advances, delayed presentation in ACS is unfortunately widespread. AWMI is more common, most of the patients have a single-vessel disease, and in-hospital mortality is low in this young population.

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