Original Article

Clinico-Epidemiological and Angiographic Profiles of Patients With Premature Acute Coronary Syndrome

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ABSTRACT

Background: Indians are more susceptible to young acute coronary syndrome (ACS), with about a fourth of the inflicted population below 40 years of age. However, the Indian population is diverse and the need for population-specific characteristics cannot be emphasized. We sought to determine the clinico-epidemiological profile of cases with young ACS among the regional population.

Methods: The present prospective observational study was carried out in a high-volume tertiary cardiac care center in north Karnataka. Patients aged below 40 years who were hospitalized with acute myocardial infarction between 2017 and 2019 to undergo invasive cardiac procedures were studied for clinico-epidemiological features. Data were analyzed using SPSS, version 23.0, and Microsoft Office 2007. All the patients' characteristics were summarized descriptively.

Results: The mean age of the study population was 36.23±3.89 years, and men were more inflicted than women (75.9% vs 24.1%). The urban population was affected more than the rural population (60.2% vs 39.8%). Most of the study population presented with chest pain (83.5%). Angiography revealed significant single-vessel disease with the involvement of the left anterior descending artery (50.3%). The common complications noted were mitral regurgitation (29.32%) and heart failure (25.5%).

Conclusions: Young ACS is almost confined to men, and chest pain is the main presentation. Single-vessel disease is more common with the left anterior descending artery being the most involved vessel. *(Iranian Heart Journal 2021; 22(2): 38-43)*

KEYWORDS: Clinico-epidemiological profile, Young MI, Angiography, Coronary artery disease

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Premature coronary artery disease (CAD) is denoted by its onset before the age of 40 years and accounts for about 3% of the entire CAD load. [1] The Global Registry of Acute Coronary Events (GRACE) study reported that acute coronary

syndrome (ACS) in the young affected 6.3% of the world population. [2] Although the GRACE study did not cover the Indian population, a CAD incidence of between 12% and 16% has been chronicled among young patients, and one-fourth of them are reported to be under the age of 40 years. [3]

In the Indian context, traditionally, men are supposed to be a major stakeholder in providing a livelihood for the family, which augments the significance of premature CAD even further. The disease may cause precipitous death or disability in apparently healthy individuals who are in their prime and lead a productive life; their unwarranted death can be appalling to their family and can be disastrous to society as a whole. [4]

Along with genetic predisposition and the reported increase in various risk factors for premature CAD, there is evidence of a more extensive angiographic involvement commonly in the left anterior descending artery (LAD) [5] and a concomitant upsurge in the need for revascularization procedures in Indians. [6]

It is essential for the treating physician/cardiologist to discern the differences in the risk factors and clinical presentations of premature CAD to predict the course of the disease and the way it differs from that seen in the old.

Nonetheless, just 8% of the published data focus on such cardiovascular disease research in India with the aim to determine the demographic data and to catalog the risk factors and the angiographic pattern of coronary artery involvement in young patients. [7] Such a paucity of evidence-based data is detrimental to the aim of establishing preventive strategies to combat the snowballing challenge of premature CAD in India. [8] Hence, the present study was designed to capture data on the risk factors, patterns, and angiographic patterns of premature CAD commonly seen among such patients in this regional population. It also

aims to provide baseline data to enable the treating physician/consultant to be more aware of the population characteristics and to manage the increasing menace of cardiovascular diseases.

We sought to characterize ACS in young adults with reference to the pattern of its clinical features, its most common risk factors, and its angiographic profile. We also documented the in-hospital outcome and mortality.

METHODS

The present study was prospective and was conducted after informed consent was obtained from all the participants admitted to a single tertiary coronary care center at Vijayapura. The study was approved by the Ethics Committee of BLDE (DU) Shri B M Patil Medical College, Hospital, and Research Center, Vijayapura (BLDEDU/IEC/413/2019-20). The center caters to the cardiac care needs of the regional population and has an emergency in-patient, intensive coronary care unit, angiography, and percutaneous transluminal coronary angioplasty facilities. Data of patients hospitalized with acute MI between 2017 and 2019 regarding age, gender, reasons (symptom) for admission, risk factors, and the duration of hospital stay were documented by detailed interviewing. A previous history of admission because of chest pain and any outpatient visit or hospital admission during the current year was also noted. History of invasive cardiac procedures, treatment, and procedural details, as well as in-hospital mortality, was also documented.

Risk factors recognized for the MI were tabulated for each of the patients, with special attention to smoking, diabetes mellitus, hypertension, and alcohol consumption. Data of all blood investigations, including fasting blood sugar, urea, creatinine, and troponin-I, were also tabulated. Based on the angiographic reports of patients who underwent coronary

angiography either during the index admission or on follow-up, significant stenosis was defined as more than 50% stenosis in a coronary artery, insignificant disease as less than 50% stenosis, or diffuse plaques in any of the coronary arteries.

RESULTS

The study population consisted of 133 patients from 775 cases admitted with acute MI during the study period. The study patients were below the age of 40 years, and they comprised 101 men (75.9%) and 32 women (24.1%). Fifteen of these patients, comprising 12 men and 3 women, were below the age of 30 years, with the youngest being 22 years of age. The majority (60.2%) of the cases with young MI were located in the urban setting.

The most common presenting symptom was chest pain (83.5%), followed by nausea and vomiting, and the classical presentation of radiating chest pain with sweating was given by a mere 9%. Apart from diabetes mellitus (30%), which is a known risk factor for CAD in the old as well, smoking (37.5%) and alcohol consumption (26.3%) subsist as the prime risk factors in the young.

Electrocardiographic evaluation of the patients with young MI affirmed the diagnosis of anterior wall MI in 55.6% and inferior wall MI in 18.79% as the most common. The average hospital length of stay was 3.08±0.94 days, and mitral regurgitation (29.32%) and heart failure (25.5%) were recognized as the most common complications. Angiography revealed single-vessel disease, more commonly involving the LAD (50.3%), followed by the right coronary artery (26.3%). Double-vessel disease constituted about 18% of the cases with young MI. Most of the admitted patients with young MI benefitted from the treatment protocol, and only 1 death was documented.

Table 1: Distribution of the risk factors in the patients with young MI

Risk Factors	N	Percentage
Smoking	50	37.5
DM	40	30
Alcoholism	35	26.3
Family history of premature CAD	26	19.5
HTN	22	16.5
DM and HTN	10	7.5

MI, Myocardial infarction; DM, Diabetes Mellitus; HTN, Hypertension

Table 2: Distribution of the diagnosis in the patients with young MI

Diagnosis	N	Percentage
AWMI	74	55.6
IWMI	25	18.79
IWMI with RVMI	10	7.51
NSTEMI	9	6.76
PWMI	8	6.01
Lateral wall MI	7	5.26
Total	133	100

MI, Myocardial infarction; AWMI, Anterior wall MI; IWMI, Inferior wall MI; IWMI with RVMI, Inferior wall + right ventricular MI; NSTEMI, Non–ST-elevation MI; PWMI, Posterior wall MI

Table 3: Distribution of the vessel involved according to angiography in the patients with young MI

Vessels Involved	N	Percentage
LAD	67	50.3
RCA	35	26.3
RCA,LAD	9	6.76
RCA,LCX	15	11.27
Recanalized vessels	7	5.26
Total	133	100

MI, Myocardial infarction; LAD, Left anterior descending artery; RCA, Right coronary artery; LCX, Left circumflex artery

Table 4: Distribution of the complication in the patients with young MI

Complications	N	Percentage
Arrhythmia	16	12.0
Cardiogenic shock	12	9.2
Heart failure	34	25.5
Mitral regurgitation	39	29.32
Pericarditis	17	12.7
AV block	1	.8
Survivor of cardiac arrest	13	9.7
Death	1	.8
Total	133	100

MI, Myocardial infarction; AV, Atrioventricular

DISCUSSION

The last 3 decades have seen an unprecedented rise in CAD cases in the young, but the data regarding premature coronary heart disease and MI (<40 y) are limited, [9] more so in the Indian context. This compelled us to determine the clinico-epidemiological profile in patients with young MI.

We included both male and female patients in the present study; and as there are no universal definitions/criteria or any guidelines to describe the cutoff age for young CAD, we defined a case with young MI as one below the age of 40 years as described by Noeman et al. [10]

A rising incidence of CAD in the younger age group has been registered in India, which is increasingly noted in men. [11] Our observations in the regional population were similar in that ACS in the young was increasingly prevalent in men (17.16%) with the mean age at infliction being 36.23±3.89 years, which is higher than the 16% rate

reported by Awan et al, [12] who also included both sexes below 40 years in their study.

With regard to the clinical presentation, our study found that patients with young MI presented with chest pain as the most common symptom, which warranted admission. This finding was not different when compared with patients with old MI. [13]

It is also noteworthy that patients with young MI also seem to have a different risk factor profile, with smoking being particularly prevalent. According to our findings, 37.5% of the study population had a current smoking history. It is well documented that a previous history of smoking and more importantly, current smoking status leads to a greater risk of MI, which is estimated to be increased threefold to fivefold. [14] The fact that smoking causes an increase in platelet aggregation, a rise in fibrinogen levels, and a concomitant decrease in the coronary reserve flow as well as fibrinolytic activity is well corroborated. Furthermore, chronic smoking leads to

endothelial damage and thrombus formation by causing a surge in the levels of catecholamines. [13]

We found that about 26.3% of our patients with young MI were chronic alcoholics, and our findings comply with the INTERHEART trial, which reported that regular alcohol consumption did not confer South Asians any protection against acute MI. There is an existing controversy as to whether moderate alcohol consumption plays a protective role and whether high alcohol intakes increase the risk of CAD. [15]

Another significant risk factor in cases with young MI is the family history of premature MI not only involving first- but also second-degree relatives. [16] In our study, a family history of premature MI as a risk factor was accountable for about 7.51% (n= 10) of the cases with young MI, which is more than that recorded in a study by Arumugam et al. [15]

On angiographic analysis of our patients with young MI, single-vessel disease more commonly with the LAD involvement was noted in 50.3% (n=67), which is in agreement with similar studies [17, 18]

Younger patients with MI have a better prognosis. An in-hospital mortality rate of just 0.8% was noted, which supports the fact that young patients have fewer in-hospital complications and a lower mortality rate. [19]

Observations from the present study prompt the authors to sincerely suggest that angina in the young be appraised in the backdrop of a detailed family history of patients as well as thorough clinical examinations to mark an early diagnosis and to curb morbidity and mortality rates in young CAD. Screening for CAD risk factors in the vulnerable population of this region should be initiated a decade earlier than the Western counterparts; furthermore, lifestyle modifications such as increased physical activity, smoking cessation, and maintaining an ideal body mass index should be advocated before adolescence.

Pharmacological interventions, as the primary prevention approach to curb mortality in cases with young MI, are more than justified too.

CONCLUSIONS

In the present study, the occurrence of MI in individuals aged below 40 years was almost exclusively seen in men mainly from the urban setting. Smoking, alcohol consumption, and family history of premature CAD were the major risk factors. Chest pain was the most common presenting symptom necessitating admission. Anterior wall MI was the most common diagnosis, with most of the patients having single-vessel disease. They had fewer in-hospital complications and a lower mortality rate.

Conflict of Interest: None declared.

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