



Clinical Profile of Acute Myocardial Infarction in Young Patients

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ABSTRACT

BACKGROUND: Coronary artery disease is a devastating disease & when the afflicted individual is under the age of 40, the tragic consequences for family, friends, and occupation are particularly catastrophic and unexpected. The purpose of the present study was to assess the risk factors & angiographic profile of very young patients (aged ≤ 40 years) with first acute myocardial infarction (AMI).

METHODS: A cross-sectional study was conducted involving 40 young (≤ 40 years) patients with clinical diagnosis of AMI. They were studied for risk factors, clinical characteristics, and angiographic results. Coronary angiography was done in all patients

RESULTS: The commonest age group was between 36-40 years (47%); 90% were male and 10% were females. The major risk factor was smoking (57.5%), followed by dyslipidaemia (55%), & hypertension (42.5%). The most common anatomical location for the MI was the anterior wall (62.5%). Most patients had single vessel disease. Left anterior descending was the commonest vessel (57.5%) involved followed by left circumflex artery.

CONCLUSION: AMI in very young almost exclusively occurs in male and smoking was the most common risk factor. Acute anterior MI owing to occluded left anterior descending artery was more frequent.

KEYWORDS

Risk Factors; Angiographic Characteristics; Acute myocardial infarction; Very young adults

INTRODUCTION

Prior to World War II coronary artery disease in men under 30 years of age was regarded as rare, and in men between 30 and 40 years of age, as uncommon [1].

However, acute myocardial infarction (AMI) has been recognized in the young age groups more frequently in recent years [2]. Additionally, AMI in very young patients aged ≤ 40 years has been poorly described. It is estimated that less than 2% of all AMIs are patients aged ≤ 40 years [3].

The conventional risk factors do not fully explain the vulnerability to coronary atherosclerosis. Hypertriglyceridemia, low levels of HDL-C, central obesity, high lipoprotein-a (Lp-a), high LDL-C, rising affluence, dietary habits, and rapid modernization associated with sedentary but stressful life-style in summation are suggested as additional risk factors for CAD. Apart from smoking, in addition, a subset of ST-segment elevation myocardial infarction in the very young (≤ 40 years) is likely related to illicit drug use [4] and [5] or to non-traditional risk factors, such as oral contraceptive use [6].

Very young patients with ST-segment elevation myocardial infarction are likely to attribute chest pain to other causes and present late. In addition, physicians taking care of such patients also are less likely to consider cardiac cause for such pain in the very young, resulting in withholding of care, inadequate care, or delays in care. The pattern of care and outcomes of the very young with ST-segment elevation myocardial infarction is therefore not well defined [7]. Coronary angiography (CAG) performed in young patients with acute myocardial infarction has identified a relatively high incidence of normal coronary arteries, non-obstructive stenosis or single-vessel disease [8], [9] and [10].

Method

The approval of the ethics committee BJ medical college, Pune, Maharashtra was obtained. This study was conducted at same institute. All patients aged ≤ 40 years with first STEMI were included in the study. Patients with previous myocardial infarction, history of percutaneous coronary intervention (PCI) and coronary artery bypass grafting (CABG) were ex-

cluded from the study. This was a cross-sectional study (case series) which enrolled 40 consecutive patients who fell into the inclusion criteria during this index period. We defined very young age as ≤ 40 years, definition that is similar to those used by others [1], [5], [7], [11], [12], [13], [14], [15], [16], [17] and [18].

The risk factors which were studied were hypertension, diabetes mellitus, smoking habits, obesity (a BMI of > 25 kg/m²), dyslipidaemia, and a family history of ischemic heart disease. Current smokers were defined as individuals who smoked cigarettes in the previous 12 months. Individuals who had quit smoking more than a year earlier were classified as former smokers [19]. Participants were classified as physically active if they reported moderate (walking, cycling) or strenuous exercise (jogging, football, vigorous swimming) for 4 or more hours per week [19].

Coronary angiography was performed in all patients to assess the number and type of vessels which were involved.

Statistical analysis

The collected data were checked and coded manually and then entered into a computer database. The numerical data obtained from the study were analysed. Data were expressed in frequency, percentage, mean and standard deviation as applicable. Data were analysed by using computer based SPSS program version 16 for statistical analysis.

Results

Maximum number of patients (47%) being within the age of 36-40 years and 2.5% of the patients being in the age group of ≤ 25 years. The frequency of AMI increased with age. The youngest patient was age 21 years old and the oldest was 40 years old. 90% of the patients were males. Baseline and clinical characteristics of patients are shown in Table 1 and Table 2. AMI in very young patients was highly prevalent in urban population (80%).

Table 1.
Baseline characteristics of the patients (n = 40).

Variables	Number (%)
Age (years)	34.44 ± 3.81
Sex (M/F)	36/4(90/10)
Urban	32(80)
Traditional risk factors:	
Smoking	23(57.5)
Hypertension	17(42.5)
Diabetes	10(25)
Dyslipidaemia	22(55)
Family H/O IHD	10(25)
Obesity	10(25)
Other risk factors:	
Hyper-homocysteinemia(n = 40)	21(52.5)
Physical inactivity	20(50)

Table 2.
Clinical characteristics of the patients (n = 40).

Variables	Number (%)
Clinical presentation:	
Chest pain	40 (100)
Shortness of breath	9 (22.5)
Nausea/Vomiting	15(37.5)
Sweating	30 (75)
Palpitation	3 (7.5)
Atypical presentation	2 (5)
Site of AMI:	
Anterior	25 (62.5)
Inferior	14 (35)
Lateral	0 (0)
Anterior & inferior	1 (2.5)

Smoking was most common risk factor for myocardial infarction (57.5%) in the young adults, hyperlipidaemia being the second common risk factor (55%). 25% of the patients had a family history of ischemic heart disease (IHD). The incidence of hypertension 42.5% and diabetes (25%) was moderate among the patients. Homocysteine level was measured in all patients. Hyper-homocysteinemia was present in 21 (52.5%) patients. Physical inactivity was present in 50% patients and obesity in 25% patients.

The most common symptom was chest pain, which was present in all the patients followed by sweating (75%), nausea/vomiting 37.5% breathlessness (22.5%), and palpitations (7.5%). In our 40 patients, 20 (50%) experienced chest pains prior to their MI. Anterior wall MI was found in 62.5% of the patients; 35% of them had inferior wall MI; 2.5% (1) had anterior & inferior wall AMI. Angiographic procedures were carried out in all patients. The left anterior descending artery was infarct related artery (IRA) in 57.5% patients, and the left circumflex coronary artery in 17.5% patients, which was seen on coronary angiography (**Table 3**).

Table 3.
Coronary angiographic characteristics of the patients (n = 40).

Variables	Number (%)
Infarct related artery:	
Normal	10 (25)
LAD	23(57.5)
LCX	7 (17.5)
RCA	0 (0)
Number of involved vessel:	
Normal	10 (25)
SVD	23 (57.5)
DVD	7 (17.5)
TVD	0 (0)
Left main disease	0(0)

A majority of the patients (57.5%) had single vessel disease which was seen on coronary angiography, followed by Normal coronaries (25%)

Discussion

Coronary atherosclerosis begins early in life, but acute STEMI in adults aged ≤ 40 years are exceptional. In the past, various mechanisms have been studied; such as rupture of a vulnerable plaque or erosion of the endothelial layer, hypercoagulable

states, coronary artery spasm, and inflammation, with atherosclerosis remaining the major cause [3]. Atherosclerotic course begins at birth and considerable lesions in coronary arteries may be apparent as early as the age of 25 or 30 years [20]. The reasons for such brisk progression of atherosclerosis, leading to MI at an early age are still being investigated. Autopsy studies in youth showed a strong relationship involving the degree of atherosclerosis in the coronary arteries with LDL-cholesterol levels, smoking status, blood pressure, and body mass index, and this association was more striking when there was a clustering of the above mentioned risk factor. The distribution of the ages of our patients showed a striking increase of the disease with ageing, which was a very obvious fact and was seen in earlier studies also [21].

One of the best documented and the most consistent risk factors for coronary atherosclerosis seems to be the male sex. The protective effects of oestrogens in preventing atherosclerosis have been clearly demonstrated in epidemiologic studies [22]. In one study [9], a profile of acute MI in young patients showed a male: female ratio of 20:1, which consistent with our study (19:1); other studies showed reduced ratio (10.1:1) [11]; 7.7:1 [12]; 5:1 [15]; 12.5:1 [16] and 9:1 [23], but the trend remains the same.

Among the many factors that have been shown to be important are cigarette smoking, hyperlipidaemia, family history of IHD, hypertension, the male sex and diabetes mellitus. These have generally been associated with an increased incidence of fibrous plaques and their sequelae. The associations are relatively strong and they are made on a group comparison basis, although all the studies have demonstrated a high degree of variability among individuals within even the most homogeneous of groups [23].

Cigarette smoking is a well-known risk factor for the development of coronary artery disease in young patients. Numerous studies have highlighted elevated rates of tobacco use among very young patients who present with AMI, with percentages ranging from 62 to 90%. In agreement with previous reports, our study confirmed that cigarette smoking (57.5%) is one of the major risk factors. Smoking adversely affects all phases of atherosclerosis given that it hastens thrombotic process, instigates endothelial dysfunction, augments proinflammatory effects, and induces coronary vasoconstriction even in patients with normal coronary vasculature [24].

Diabetes and hypertension were common in very young adults in our study, which was seen in earlier studies also [11], [12], [13], [15]. In our study 25% of patients had a positive family history of IHD which consistent with other studies [12], [13]. In contrast to our study, some other studies showed low incidence of positive family history of IHD [11], [15].

Obesity was the infrequent cause in all the earlier studies 3.3–20% [12], [17], but in our study it was 25%. In the present study, the hyperhomocysteinemia rate in patients with AMI was 52.5%, which was consistent with study done by Masoomi et al. [25]49.4%. These observations are important for primary prevention of AMI in India. The mechanisms that may explain how homocysteine can increase the risk of AMI include its effect on the vascular endothelium, platelets and its role in increasing the risk of thrombosis (26).

Chest pain was the most common presentation in our study, which was similar to an earlier study also [23]As in earlier studies [15], [17], [23], in our study too, anterior wall MI was very common among the patients aged ≤ 40 years.

We could see that single vessel disease was evidently more common among the young adults, which had been reported by others also earlier [13], [15], [16], [17], [23].

In the study by Glover et al. [27], 120 consecutive patients 35 years or younger underwent coronary angiography following a clinical MI. Significant CAD was seen in 78% and

the prevalence of triple-vessel CAD was 42%. Thomas et al., studied 60 patients less than 35 years of age following a first MI [28]. Significant CAD was present in 73.3%. However triple-vessel CAD was seen only in 5%. In 25% there was involvement of more or equal to three coronary artery segments.

The cause of the acute obstruction in patients without significant obstruction is still not completely clear; coronary spasm or thrombosis with reperfusion have been suggested as possible causes. Although the coronary angiogram does not demonstrate significant obstruction in these patients, this does not always exclude atherosclerosis with positive remodelling of the artery. Rupture of an insignificant plaque causing temporary obstruction by a clot may cause an infarct. Subsequent lysis is possible and may leave the lumen intact.

Study limitations

This study did not have any control group and so the risk of each factor could not be analysed. Also, the statistical significance of the factors couldn't be analysed.

Conclusion

Smoking was the most common risk factor of MI followed by dyslipidaemia in very young adults. Acute anterior STEMI owing to occluded left anterior descending artery was more frequent. A majority of the patients had single vessel disease which was seen on coronary angiography. The cessation of smoking would play a major role in preventing MI in very young adults.

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