

Clinical profile of acute myocardial infarction in young adults

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Abstract

Background: Acute myocardial infarction (MI) in young patients, poses the unique problem to treat for physicians. For chest pain in young age group, physicians less likely to consider cardiac cause and may be misdiagnosed for other diseases. In addition, these patients may have different risk factor profiles, clinical presentations, and prognosis compared to older patients.

Objective: To study the clinical profile of acute MI in young adults.

Material and Methods: This was a cross-sectional prospective study carried out in patients aged ≤ 40 years and admitted to the hospital with a diagnosis of ACS. History collection, clinical examination, ECG, echocardiography, laboratory investigations were performed as a part of routine diagnosis and treatment for all the patients. The risk factors for MI were also recorded. Coronary angiography was performed in all patients. All the patients were given necessary treatment and they were followed up till the discharge from the hospital. These patients were also observed for development of any complication after the myocardial ischemia.

Results: The mean age of the patients with acute MI was 35.00 ± 4.67 years, with a maximum number of patients (56, 52.34%) belong to the age of 31–35 years. Majority of the patients (103, 96.26%) were male. The most common presenting symptom (91, 85.05%) was chest pain. One or more risk factors were found to be present in 78 (72.90%) study patients. Smoking was most common (35, 32.71%) risk factor for MI. Acute MI with ST segment elevation was present in 105 (98.13%) patients. Anterior wall MI was the commonest type seen on ECG (103, 96.26%). A majority of the patients (80, 74.77%) had single vessel disease. Cardiogenic shock was the commonest post-MI complication and contributed to all 5 deaths.

Conclusion: Young MI is found to be more common in male gender. Smoking and diabetes mellitus found to be most common risk factors for MI. Education of patients about smoking cessation, control of diabetes, and also education about modification of other risk factors of young MI can serve as primary prevention for the disease.

KEY WORDS: Young MI, Risk factors for young MI, Clinical profile, ECG and angiographic findings of young MI

Introduction

An acute myocardial infarction (MI) is a subset of a spectrum of Ischemic Heart Disease (IHD) that includes unstable

angina and acute MI with or without ST elevation.^[1] IHD places a massive health burden on humanity. In developed countries, half of all deaths are because of CVD and a quarter due to IHD.^[2] In developing countries like India, the problem is no less; IHD may become a leading cause of death and disability in our country by the year 2025.^[2]

IHD were rare under 30 years of age and uncommon between 30 and 40 years of age, prior to 1950s.^[3] In recent times the trend of disease has changed. Acute MI has been found in the young age groups more frequently in recent years.^[4] Briefly, 4–8% of the patients with acute MI are less than 40 years of age. Persons in the middle age group are in the maximal productive phase of their life with maximum family and social responsibility. Getting affected by the disease at this age leads to tremendous loss to the family and community.

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Acute MI in young patients presents the unique problem to treat for physician. For chest pain in young age group, physicians less likely to consider cardiac cause and may be misdiagnosed for other diseases.^[6] In addition, these patients may have different risk factor profiles, clinical presentations, and prognosis compared to older patients.^[7] Risk factors for an MI can be classified into three categories: (i) non-modifiable: age, sex, and family history; (ii) modifiable: smoking, alcohol intake, physical inactivity, poor diet, hypertension, type 2 diabetes, dyslipidemias, and the metabolic syndrome; and (iii) emerging: C-reactive protein (CRP), fibrinogen, coronary artery calcification (CAC), homocysteine, lipoprotein(a), and small, dense low-density lipoprotein (LDL).^[2]

There are few studies of risk factor profile and the clinical profile of such young patients with acute MI. Hence, this study was planned with objective to study the clinical profile of acute MI in young adults.

Material and Methods

This was a cross sectional prospective study to evaluate the clinical profile and risk factors for young patients with MI. The study was approved by the institutional ethics committee and written informed consent was obtained from the participants.

Inclusion criteria: All patients aged ≤ 40 years and admitted to the hospital with a diagnosis of ACS. The final diagnosis of ACS will be based on two out of three of the following criteria:

- Ischemic chest pain for at least 30 min.
- Electrocardiogram (ECG) evidence of ACS.
- Rise/fall of the cardiac biomarker troponin.

Exclusion criteria: Patients with stable angina, those who are below 18 years and patients who are unwilling to participate in the study were excluded.

Study Procedure

All the patients meeting inclusion and exclusion criteria were evaluated thoroughly. History collection, clinical examination, ECG, echocardiography, laboratory investigations such as complete blood count, lipid profile, blood sugar level, cardiac markers, urine analysis, and other routine investigations were performed as a part of routine diagnosis and treatment for all the patients.

The risk factors which were studied were hypertension, diabetes mellitus, smoking habits, obesity (a BMI of $> 25 \text{ kg/m}^2$), type A personality, sedentary life style, dyslipidemia, family history of ischemic heart disease, and smoking and alcohol consumption.

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

All the patients were given necessary treatment and they were followed up till the discharge from the hospital. These

patients were also observed for development of any complication after the myocardial ischemia.

Statistical Analysis

Data were expressed in frequency, percentage, mean and standard deviation as applicable. Data were analyzed by using Microsoft excel.

Results

This study was carried out to study the clinical profile of acute MI in young patients between the age of 21 and 40 years. The mean age of the patients with acute MI was 35.00 ± 4.67 years, with a maximum number of patients (56, 52.34%) belong to the age of 31–35 years and 5.61% of the patients belong to the youngest age group of 25–30 years (Figure 1). Majority of the patients (103, 96.26%) were male (Figure 2).

In the present study, majority of the patients (91, 85.05%) presented with chest pain, which was present in 90% of the patients, followed by sweating (66, 61.68%), difficulty in breathing (42, 39.25%), shoulder pain (23, 21.50%), nausea and vomiting (18, 16.82%). Some of the patients (28, 26.17%) also had other pain like epigastric pain, back ache, etc. (Table 1).

On evaluation of history and clinical examination, one or more risk factors were found to be present in 78 (72.90%) study patients while no risk factor was present in 29 (27.10%) patients. Two risk factors were found to be present in 39 (36.45%) study patients followed by single risk factor in 35 (32.71%) patients. Smoking was most common risk factor for MI (35, 32.71%) in the young adults; diabetes mellitus being the second common risk factor (22, 20.56%) (Table 2 and Figure 3).

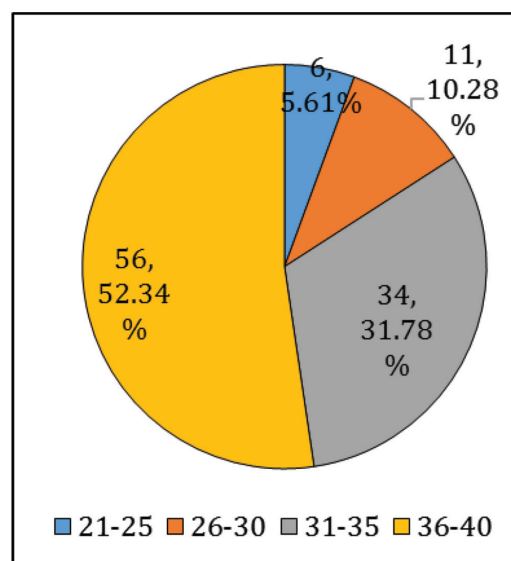


Figure 1: Distribution of patients according to age.

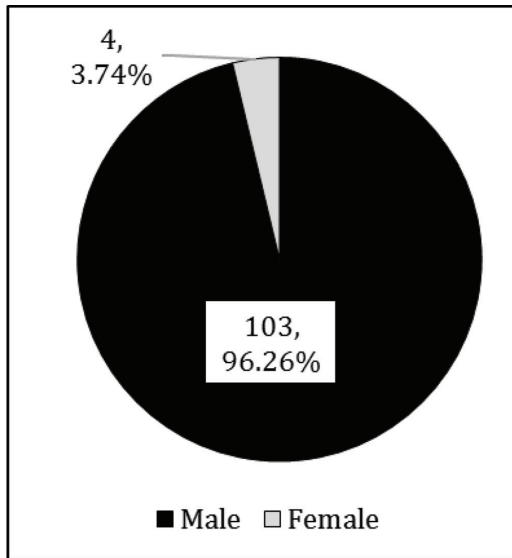


Figure 2: Distribution of patients according to gender.

Table 1: Distribution of patients according to different symptoms

Symptoms	N	%
Chest pain	91	85.05
Sweating	66	61.68
Difficulty in breathing	42	39.25
Shoulder pain	23	21.50
Nausea and vomiting	18	16.82
Other pain (epigastric, back, etc.)	28	26.17

Table 2: Distribution of patients according to the presence of number of risk factors

No. of risk factors	N	%
0	29	27.10
1	35	32.71
2	39	36.45
3	3	2.80
4	1	0.93
Total	107	100.00

On the basis of ECG findings, acute MI with ST segment elevation was present in 105 (98.13%) patients. Anterior wall MI was the commonest type seen on ECG (103, 96.26%). All the patients who died in hospital had acute MI with ST segment elevation (Table 3).

Angiographic procedures were carried out in all patients. A majority of the patients (80, 74.77%) had single vessel disease. Normal coronaries arteries was found in 9 (8.41%) patients. The left anterior descending artery was infarct

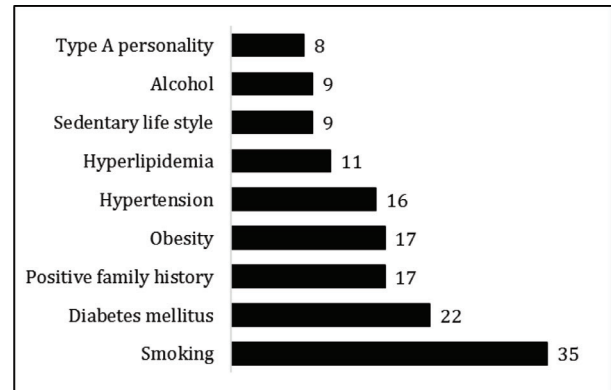


Figure 3: Distribution of patients according different risk factors.

Table 3: ECG characteristics in patients with acute myocardial infarction

Characteristics	N	%
ST-segment elevation myocardial infarction	105	98.13
Non ST-segment elevation myocardial infarction	2	1.87
Anterior wall myocardial infarction	103	96.26
Anterior + inferior wall myocardial infarction	2	1.87
Anterior + lateral wall myocardial infarction	1	0.93

Table 4: Coronary angiographic characteristics in patients with acute myocardial infarction

Characteristics	N	%
<i>Infarct-related artery</i>		
Normal	9	8.41
LAD	98	91.59
LCX	10	9.35
RCA	17	15.89
<i>Number of involved vessel</i>		
Normal	9	8.41
SVD	80	74.77
DVD	9	8.41
TVD	9	8.41
Left main disease	2	1.87

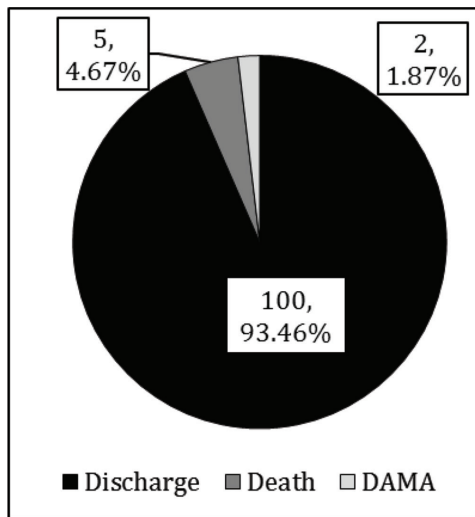
related artery in majority of the patients (98, 91.59%), and the right coronary artery in 15.89% patients, which was seen on coronary angiography (Table 4).

Coronary interventions were carried out in 29 patients. Among them 14 patients underwent Percutaneous transluminal coronary angioplasty (PTCA) alone while 15 patients were underwent PTCA with stenting.

During hospital stay, 15 patients developed post-MI complications, cardiogenic shock being the commonest of them in 7 patients and contributed to all 5 deaths occur in patients with acute MI. A majority of the patients (100, 93.46%) were discharged from hospital after recovered from MI (Table 5 and Figure 4).

Table 5: Post-myocardial infarction complications in patients with acute myocardial infarction

Complications	N	%
Acute left ventricular failure	1	0.93
Congestive heart failure	3	2.80
Cardiogenic shock	7	6.54
Cerebrovascular stroke	1	0.93
Post-infarct angina	3	2.80

**Figure 4:** Outcome in patients with acute myocardial infarction (DAMA: discharge against medical advice).

Discussion

The occurrence of MI in young age is increasing now-a-days. It is responsible for high morbidity and mortality in young patients. Therefore, present study was carried out to observe the clinical profile of acute MI in young patients between the age of 21 and 40 years. The mean age of the patients with acute MI was found to be 35.00 ± 4.67 years in the present study which is almost similar to study by Alappatt et al.^[8] In this study, majority of the patients (103, 96.26%) were male. A similar study by Alappatt et al.^[8] also showed male preponderance, reporting that 74% of patients were male. This finding coincides well with the literature showing prevalence of young MI in Indian females is around 5%.^[9] This may be due to a genuine low prevalence of coronary heart disease in young women in developing countries together with the well-known lower prevalence in pre-menopausal women due to the protective role of estrogen.

Various studies have been carried out to identify different causes and risk factors for development of MI in young age group. Various researchers have studied various mechanisms such as rupture of a vulnerable plaque or erosion of the endothelial layer, hypercoagulable states, coronary artery

spasm, inflammation, etc. with atherosclerosis remaining the major cause.^[10] Atherosclerotic course begins at birth and considerable lesions in coronary arteries may be apparent as early as the age of 25 or 30 years.^[11] Reasons for fast progression of atherosclerosis can be the risk factors for development of MI in young age group. It was identified in this study that majority of young MI patients (72.90%) had risk factors present. It was also identified in this study that 36.45% of patients had two risk factors present simultaneously, which enhances the risk.

Smoking was identified as most common risk factor for MI (35, 32.71%) in the young adults and diabetes mellitus as the second common risk factor (22, 20.56%). Numerous studies have highlighted elevated rates of tobacco use among very young patients who present with AMI, with percentages ranging from 62% to 90%. Smoking adversely affects all phases of atherosclerosis given that it hastens thrombotic process, instigates endothelial dysfunction, augments pro-inflammatory effects, and induces coronary vasoconstriction even in patients with normal coronary vasculature.^[12] Various other studies also reported high prevalence of diabetes and hypertension along with young MI which is similar to our study and also to the existing literature.^[13-16]

Chest pain was the most common presentation in our study. The most common anatomical location for the MI was the anterior wall (96.26%). Most patients had single vessel disease (74.77%). Left anterior descending was the commonest vessel (91.59%) involved. These findings of present study are well co-incising with the similar study from India.^[17] Coronary interventions were carried out in 29 patients in our study and among them 14 patients underwent Percutaneous transluminal coronary angioplasty (PTCA) alone while 15 patients were underwent PTCA with stenting. Even with the drug treatment and coronary interventions, risk of complications and death was reported in our study. This requires attention of all health care professionals.

Although this study has effectively highlighted the clinical profile of young MI patients, there were few limitations. This study was conducted in a single center, which may not be representative of whole population. In this study, as no control group was used, the risk of each factor could not be analyzed statistically. Larger studies involving multiple centers are required focusing on the risk factors and management of young MI.

Conclusion

In conclusion, acute MI in young patients is more common in men in Indian regions. Smoking was the most common risk factor of MI which was seen in young adults followed by diabetes mellitus. Most of the patients had anterior wall MI. 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 young adults. Early diagnosis and early interventions are essential for young MI patients to reduce mortality. Education of patients about

smoking cessation, control of diabetes, hypertension and also education about modification of other risk factors of young MI can serve as primary prevention for the disease.

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