



## A study on clinical profile, risk factors and outcome of myocardial infarction in young adults [Below 40 years]

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### Abstract

**Background:** Acute myocardial infarction (MI) in young patients is a significantly raising problem particularly in India. This has aroused considerable interest in recent years and being recognized with increasing frequency. The chest pain in younger age group may be misdiagnosed for other diseases. In addition, the various aspects of myocardial infarction such as risk factor profiles, clinical presentations and prognosis differ significantly in young people when compared to older patients.

**Objective:** To study the clinical profile, risk factor profile and outcome of acute MI in young adults.

**Material and Methods:** This was a prospective study carried out on around 50 young persons below the age of 40 years admitted in ICCU for acute MI under Khaja Banda Nawaz Teaching and General Hospital over a period of 3 years. The patients above the age of 40 years and below the age of 18 years along with those who had associated valvular heart disease and anemia have been excluded from the study. After a detailed history and thorough clinical examination routine investigations were done. Other investigations like ECG, serum cardiac markers such as CPK-MB, Troponin-I, LDH, SGOT and 2-D Echo was done to diagnose MI. A special attention was paid to risk profile. 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:** Out of 50 young MI patients, 47 patients were male and 03 patients were female. The mean age of the patients with acute MI was  $34.33 \pm 5.67$  years, with a maximum number of patients (21, 42.0%) belonging to the age of 31–35 years. Majority of the patients (47, 94.0%) were male. The most common presenting symptom (45, 90.0%) was chest pain. One or more risk factors were found to be present in 42 (84.0%) patients. Smoking was the most common (32, 64.0%) risk factor for MI followed by hyperlipidemia (21, 42.0%), hypertension (12, 24%), obesity (12, 24%) and diabetes mellitus (10, 20%). The most common type of MI was STEMI which was present in 46 (92.0%) patients. In that, Anterior wall MI was the commonest type seen on ECG (37, 74.0%). Arrhythmias were the commonest complication followed by left ventricular failure. All the patients responded well to the medical line of treatment except 3 who died because of cardiogenic shock.

**Conclusion:** The incidence of acute MI in young patients is increasing day by day which was thought earlier less common among young individuals. This may be because of their lifestyle. Young MI is found to be more common in male gender. Smoking, dyslipidemia and obesity are found to be most common modifiable risk factors for MI. It is important to recognize these patients for the purpose of risk factor modification and secondary prevention in younger patients. Education of patients about smoking cessation and also education about modification of other risk factors in youngsters can serve as primary prevention for the disease.

**Keywords:** young MI, risk factors, clinical profile, 2-D echo and ECG

### Introduction

Myocardial Infarction (MI) is a condition characterized by necrosis of the myocardium due to prolonged irreversible ischemia following coronary occlusion. It is an important disease entity in developed nations and recently in developing nations [1]. It usually affects the middle and older age groups. It is an uncommon disease in young adults and its incidence varies between 2%-10% according to different survey [2]. Moreover people in our part of the world suffer from CAD at relatively younger age, i.e., about half of MI occurs under the age of fifty years [3]. The etiology of MI is multifactorial, the major being coronary artery disease with atherosclerosis [4] which is influenced by various risk factors. The young MI patients may have different risk factor profiles, clinical presentations, and prognosis compared to older patients [5]. Young patients are more likely to have a history of smoking

and dyslipidemia, but less likely to have other comorbidities, such as diabetes mellitus, hypertension, or prior coronary artery disease. In addition, patients with premature MI tend to present fewer diffuse atherosclerotic coronary arteries [2, 9D]. To Risk factors for an MI can be classified into three categories. For chest pain in younger age group, physicians are less likely to consider cardiac cause and may be misdiagnosed for other diseases [6]. This study was done to know the clinical profile, risk profile and outcome in young individuals with acute MI.

### Materials and Methods

This study was done on 50 young patients below the age of 40 years having acute myocardial infarction admitted in ICCU under Khaja Banda Nawaz Teaching and General Hospital over a period of 36 months. This was a prospective study to

evaluate the clinical profile, risk factors and outcome of young patients with MI. The patients below the age of 40 years with typical clinical presentation of MI which was confirmed by ECG and cardiac markers were included. The patients above the age of 40 years and below the age of 18 years along with those who had associated valvular heart disease and anemia have been excluded from the study. After a detailed history and thorough clinical examination, routine investigations were done including ECG, serum cardiac markers, RBS, Lipid profile, chest x-ray and 2D-echo to confirm the diagnosis. The special attention was paid to the presence of risk factors. The risk factors which were studied were hypertension, diabetes mellitus, smoking habits, obesity (BMI>30kg/m<sup>2</sup>), dyslipidemia and family history of ischemic heart disease.

## Results

The 50 young patients who had presented with acute MI have been taken for the study. Out of 50 patients, 47 (94%) were males and 3(6%) were females. The age of distribution varied from 22 -40 years. The mean age was 34.33±5.67 years. The peak incidence of MI occurred between the age group 31-40 years around 80% [Table 1]. Majority of the patients were male. The most common presentation was chest pain(90%) followed by profuse sweating(60%), nausea/vomiting(38%), anxiety/nervousness(38%), abdominal discomfort(36%), radiation to left shoulder/arm(44%), palpitation(36%) and breathlessness(28%) [Table 2]. The smoking (32, 64%) was found to be most common risk factor. Among the 32 patients who smoked, the 72% used to smoke 10- 15 cigarettes/day, 18% smoked 5- 10 cigarettes/day and 10% smoked less than 5 cigarettes / day. The second most common risk factor hyperlipidemia (21, 42%) followed by hypertension (12, 24%) diabetes mellitus (10, 20%) and obesity (12, 24%). Out of 50 patients, 12% of the patients had the family history of premature coronary artery disease [Table 3]. One or more risk factors were found to be present in 42 (84.0%) patients while no risk factor was present in 08 (16%) patients. Three risk factors were found to be present in 02(4.0%) patients; two risk factors were found to be present in 18 (36.0%) patients, followed by single risk factor in 21(44.0%) patients [Table 4]. The STEMI was the most common type of MI in 46(92%) patients. In that 37(74%) patients had anterior wall MI and 09(18%) patients had inferior wall MI. out of 50 patients, 04 (08%) patients presented with NSTEMI [Table 5]. This was recognized by ECG, elevated cardiac markers and confirmed by 2D Echo. Anterior wall MI was the most common type of MI on ECG. The 2D Echo showed regional wall hypokinesia in 76% of patients, papillary muscle dysfunction in 2% of patients and 2D Echo was normal in 22% of patients. The mean ejection fraction was 54.2±6.8 in 37 patients, 45.4±4.6% in 08 patients and < 45% in 2 patients. The 82% of patients presented with in 6hours of onset of symptoms and 18% presented between 6-12 hours after the onset of symptoms.

All the patients received aspirin, clopidogrel, statins and anticoagulants. The STEMI group received thrombolytic. Beta blockers were recommended to 28 patients and 12 patients were treated with ACE- inhibitors. Out of 50 patients, Only 07 patients had complications. Out of 07 patients, 02(4%)

patients had arrhythmias, 03 (6%) patients had left ventricular failure and 02(4%) patients were in cardiogenic shock [Table 6]. The left ventricular failure was the most common complication. The complications were more common with patients who had STEMI. Out of 50 patients, 47 patients improved with medical line of management and 3patients expired. They had less morbidity and mortality during the hospital stay. All were discharged (except 3patients who died) from hospital after recovery and advised to undergo angiography to all patients. They were referred to other hospital for angiography. Out of 47 patients only 32 patients came for follow up with angiographic reports. In the report majority showed single vessel disease involving left anterior descending artery in 18 patients and the right coronary artery in 06 patients and 08patients had normal reports.

**Table 1:** Age and Sex distribution of patients

Age in years	Male	Female	No. of Patients	Percentage (%)
20-25	01	-	1	02
26-30	08	-	08	16
31-35	20	01	21	42
36-40	17	02	19	38
Total	47	03	50	100

**Table 2:** Clinical symptoms

Clinical symptoms	No. of patients	Percentage
Chest pain	45	90
Profuse sweating	30	60
Nausea/vomiting	19	38
Anxiety/nervousness	19	38
Breathlessness	14	28
Abdominal discomfort	18	36
Palpitation	18	36
Radiation to left shoulder/arm	22	44

**Table 3:** Incidence of Risk Factors in patients

Risk Factors	No. of patients	Percentage (%)
Smoking	32	64
Hypercholesterolemia	21	42
Hypertension	12	24
Diabetes Mellitus	10	20
Obesity	12	24
F/H/O Premature CAD	06	12

**Table 4:** Incidence of number of risk factors

No. of risk factors	No. of patients	Percentage (%)
0	08	08
1	20	40
2	19	38
3	02	04
>3	01	02
Total	50	100

**Table 5:** Type of Myocardial infarction [ECG based]

Type of MI	No. of patients	Percentage (%)
Anterior Wall MI	37	74
Inferior Wall MI	09	18
Non ST Elevation MI	04	08
Total	50	100

**Table 6:** Incidence of Complication

Complication	No. of patients	Percentage (%)
Cardiogenic shock	02	04
Left Ventricular failure	03	06
Arrhythmias	02	04

### Discussion

The Myocardial Infarction (MI) is an uncommon disease in young individuals and its incidence varies between 2% and 10% [2]. But the occurrence of MI in young individuals has increased in recent years. 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 [7]. Atherosclerotic course begins at birth and considerable lesions in coronary arteries may be apparent as early as the age of 25 or 30 years [8]. Reasons for fast progression of atherosclerosis could be due to the presence of risk factors which led to the development of MI in young age group. It was identified in this study group that majority of young MI patients (84.0%) had risk factors and about 44.0% of patients had more than one risk factor. In the study of Akhtar *et al* [9], 55% of patients had 3 or more risk factors. Therefore as the number of risk factors increase in an individual, the risk of IHD also increases.

The IHD has been reported to be more frequent in recent years in younger age group<sup>10</sup>, but the risk definitely increases with the increasing age. The mean age of the patients with acute MI was found to be  $34.33 \pm 5.67$  years in the present study. The peak incidence of MI occurred between the age group 31-40 years around 82%. Data from literature indicate that nearly the 10% of all patients hospitalized for AMI are <45 year [11, 12].

Male sex is an important risk factor for IHD especially at a younger age. Previous studies suggested that myocardial infarction is predominantly a disease of male [12]. The lifetime risk of developing CAD at 40 years of age is 50% for men and 33% for women [13]. The literature shows the prevalence of MI in young Indian females is around 5% [14]. The low incidence in premenopausal women may be because of estrogen, but the presence of diabetes takes away this advantage [13]. In our study, majority of the patients (47, 94.0%) were male. In the study of Akhtar *et al* [9], 85% of patients were male.

Smoking is the most important preventable cause of CAD [15]. It causes premature CAD due to a number of factors. It has unfavorable effects on lipoprotein and decreases HDL [16]. Smoking adversely affects all phases of atherosclerosis given that it hastens thrombotic process, promotes endothelial dysfunction, augments pro-inflammatory effects, and induces coronary vasoconstriction even in patients with normal coronary vasculature [17, 18]. Numerous studies have highlighted that increased rates of tobacco use among very young patients who present with AMI, whose percentages ranges from 70% to 90% [2, 12]. In our study, smoking was identified as a most common risk factor for MI (64%).

Hypertension and diabetes mellitus, both are well established cardiovascular risk factors but are not as prevalent in younger age groups as they are in older ones. In our present study 24%

of patients were hypertensive and 12% of the patients were diabetic. These observations are consistent with several studies [19, 11, 12]. But various other studies reported high prevalence of diabetes and hypertension along with young MI [20, 21]. The study conducted by Akhtar *et al* in 1993 on young patients of IHD, 47.6% of patients were found to be hypertensive and 35.7% were diabetic [9]. Gandapur *et al* [22], reported 14% of their patients to be diabetic in their study.

Dyslipidemia is one of the major modifiable IHD risk factor. High TG and low HDLC levels, which characterize the dyslipidemia of metabolic syndrome, have roles in atherosclerosis and coronary heart disease development [23]. In our study 21(42%) patients had dyslipidemia. They had high TG and low HDL-C levels. These results in the present study were similar with the studies in the past [24, 23]. Akhtar *et al* [9], reported dyslipidemia in 63.2% of patients in his study.

Obesity is an independent risk factor for CAD in both men and women [25]. Weight reduction is associated with favorable changes in lipid profile and blood pressure and hence reduces the risk of IHD [26]. In our study only 12 (24%) patients were found to be obese.

A family history of coronary heart disease is considered to be one of the most relevant risk factors for the early onset of AMI [2, 12, 19]. The exact mechanisms are not fully explained, but recently it has been widely demonstrated that genetic background may play a role in the development of ischemic heart disease [27]. Our study showed that 12% of patients had family history of premature CAD.

The chest pain was the most common presentation in our study. The most common anatomical location for the MI was the anterior wall (96.26%). Majority of them had STEMI and only 04(08%) patients had Non STEMI. All the patients were managed with medical line of treatment. Only 07 patients developed complications. In that, 03 patients went into cardiogenic shock and died. Remaining patients had a better outcome. The hospital morbidity and mortality was less compared to older patients. They were referred to other hospital for angiography and we could obtain only 32 patients report. Majority of them had single vessel disease involving Left Anterior descending artery. In that 04 patients underwent Percutaneous Trans luminal coronary angioplasty (PTCA) and 02 patients underwent PTCA with stenting.

### Study Limitations

This study has certain limitations. This study is done on only small group of patients which may not be a representative of whole population. This is not a comparative study. We have not used older patients to know what risk factors are more prevalent in them and also how their outcome is compared to younger patients. Secondly we could not get the angiographic reports of other 16 patients. Even though this study highlights the clinical profile, risk profile and outcome of young MI patients, larger studies are required to confirm this.

### Conclusion

In conclusion, acute MI in young patients is becoming a raising problem in Indian regions which is more common in men. Smoking was the most common risk factor of MI in them indicating atherosclerosis could be the commonest cause followed by dyslipidemia. The incidence of hypertension and

diabetes was less in these patients compared to elderly patients. The chest pain was the most common clinical presentation and STEMI was the commonest type of MI. Even though clinical course and outcomes are better than the older patients, early diagnosis and early interventions are essential for young MI patients to reduce mortality. The present study demonstrated that young patients with STEMI are predominantly male, smokers and had dyslipidemia like other studies.

So the community should be educated about smoking cessation and also about the control of other modifiable risk factors along with routine screening which would help in preventing coronary artery disease in them, who belong to the highly productive group in the community.

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