

CLINICAL PROFILE OF ACUTE MYOCARDIAL INFARCTION YOUNG ADULTSPatel G. N. Ravi¹, Khandeparkar Viraj², Kotha Sindhoora³, Cacodcar Jagadish⁴**HOW TO CITE THIS ARTICLE:**

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ABSTRACT: BACKGROUND: Although acute myocardial infarction was believed to be an uncommon entity in the young, of late there has been a rising incidence in this group of population. The analysis of its clinical profile, including the etiologic and the risk factors gains much importance, for the preventive purpose. **AIMS AND OBJECTIVES:** To study the clinical profile of acute MI, including the evaluation of the cardiac enzyme markers, the risk factors, the management and the complications and outcome of this group of patients aged 40 years or younger. **RESULTS:** Majority of patients belonged to the age group of 36-40years. 31 patients were overweight and 16 patients were obese. 46 patients (67.64%) had anterior wall myocardial infarction, 22 patients had inferior wall myocardial infarction (32.35%) and ST-elevation myocardial infarction was found in 69.2% of patients. Smoking/tobacco use was the most common risk factor (64.70%) followed by dyslipidemia (60.29%), metabolic syndrome (52.94%) diabetes mellitus (52.94%), hyperhomocysteinemia (52.94%), alcohol consumption (48.52%), hypertension (34%), family history (26.47%), obesity (23.52%). Other than these, two patients had chronic kidney disease stage 3, two female patients were irregular oral contraceptive pill users, one was diagnosed as systemic lupus erythematosus and another patient had antiphospholipid antibody syndrome. **Conclusions:** Apart from early diagnosis and adequate treatment of acute MI in young patients, it is also essential to identify and prevent or control the risk factors at primary and secondary level.

KEYWORDS: Myocardial infarction in the young, Smoking, Obesity.

INTRODUCTION: Although acute myocardial infarction is an uncommon entity in the young, the burden of acute myocardial infarction can be substantial if the individual is relatively young, as they are commonly bread winners of the family and in the prime of their working life with significant contributions to society. Younger patients have different risk factors, clinical presentation and prognosis, than the older patients. All of these factors should be taken into consideration when treating young patients with coronary artery disease (CAD).^{1,2} The disease carries a significant morbidity, psychological effects and financial constraints for the person and the family when it occurs at a younger age.¹

Many early studies evaluating these patients labeled them as having "premature" CAD, but it is now better understood as a rapidly progressive form of the disease. Subsequently, this subgroup has been the subject of numerous observational series seeking to identify what sets them apart.³ The risk factors noted are smoking, diet rich in cholesterol, sedentary lifestyle, diabetes, hypertension and paternal history of cardiovascular disease.⁴

Younger patients also featured a higher incidence of single vessel and a lower rate of triple vessel disease. Due to wide range of etiologies diagnostic coronary angiography should be performed in all cases to establish the cause of infarction and guide therapy.¹

RESEARCH QUESTIONS:

1. What are the types and modes of presentation, of myocardial infarction in the young population?
2. What is the relative incidence of risk factors?
3. What is the management of such patients?
4. What are the complications and the outcome of these patients?

METHODOLOGY:

Type of Study: Case series.

No. of Subjects: 68.

Duration of study: 1st September 2012 to 30th August 2013.

Data was entered in a pretested questionnaire consisting of 64 questions:

- 4 were related to patients' particulars.
- 6 were questions regarding main presenting complaint and associated symptoms.
- 6 related to past history.
- 2 were pertaining to relevant family history of the subjects.
- 5 questions were related to personal history of the subjects.
- The next 4 points related to general examination and vitals of the patient.
- Next 4 were for systemic examination findings.
- 6 points for electrocardiographic findings.
- The next 12 were laboratory investigations.

INCLUSION CRITERIA: All patients aged 40 years or younger admitted to Goa medical college and hospitals with a diagnosis of acute MI.

- The final diagnosis of acute MI is based on two the WHO-2004 criteria: any of these two is considered as diagnosis of acute MI,

* Ischemic chest pain for at least 30 minutes.

* ECG evidence of myocardial injury:

0.1 mv or more ST segment elevation in 2 contiguous leads.

Or

1mv or more ST depression or definite T- wave inversion or both.

*An increase in serial CKMB or serial troponin- I.

EXCLUSION CRITERIA: Those patients, 40 years or younger, with acute MI, who refused to give consent for the study.

RESULTS:

- Among the 68 patients studied, 58 patients were male and 10 were female.
- The age group was between 22 to 40 years. Youngest patient was 22 year old female.
- Majority of patients belonged to the age group of 36-40years, with a mean age of 36.26years.
- It is found that majority of patients had an increased BMI. 21 patients had normal BMI, 31 patients were overweight and 16 patients were obese.
- Among the 68 patients, 15 males had a waist/hip ratio >0.90 and 8 females had a waist/hip ratio > 0.85.

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Majority 56(82.35%) of the patients presented with typical chest pain and 8 patients (17.35%) presented with atypical symptoms. Among atypical symptoms 5 had heaviness in chest, 3 had profuse sweating, 3 had sudden collapse and one presented with epigastric pain and vomiting. Among associated complaints, the most common complaint was sweating (58.88%).

On ECG, 46 patients (67.64%) had anterior wall myocardial infarction, 22 patients had inferior wall myocardial infarction (32.35%) and ST-elevation myocardial infarction was found in 69.2% of patients.

On 2D Echocardiography, 43 patients (63.23%) were detected to have regional wall motion abnormalities 35 of them belonging to anterior wall myocardial infarction group (81.39%). Severe left ventricular dysfunction [Left Ventricular Ejection Fraction (LVEF) < 35%] was seen in 14 with anterior wall myocardial infarction group and 4 with inferior wall myocardial infarction group. Moderate left ventricular dysfunction (LVEF between 36-40%) was detected in 10 anterior wall myocardial infarction group patients. Mild left ventricular dysfunction (LVEF between 41- 45%) was seen in 6 anterior wall myocardial infarction group patients and 1 inferior wall myocardial infarction group patient. 34 patients had normal Left ventricular function (LVEF >45%). Incidentally two patients were detected to have left ventricular clot and one patient was found to have mitral regurgitation.

Among the 68 patients, coronary angiogram was performed in 54 patients. Majority, 38(55.55%) patients were detected to have single vessel disease. Double vessel disease and triple vessel disease was seen in 11(20.37%) and 5(9.25%) patients respectively. Normal coronary angiogram was observed in remaining 8 patients (14.81%). Out of the 11 patients with double vessel disease, 9 had diabetes mellitus. Most of them were in the age group of 36-40years, all having more than one risk factor. Out of the 5 patients with triple vessel disease, 3 had diabetes mellitus and one was a 22 year old female with antiphospholipid antibody syndrome not on any anticoagulation.

Majority of patients (37) in present study underwent percutaneous coronary intervention (30 patients- post thrombolysis per cutaneous transluminal coronary angioplasty, 6 patients- primary percutaneous intervention and 1 patient-rescue per cutaneous transluminal coronary angioplasty). 27 patients were managed medically out of which 19 patients were thrombolysed with streptokinase and 8 patients were treated with low molecular weight heparin. Remaining 4 patients out of the 68 underwent coronary artery bypass grafting.

RISK FACTORS: Smoking/tobacco use is the most common risk factor (64.70%) followed by dyslipidemia (60.29%), metabolic syndrome (52.94%) diabetes mellitus (52.94%), hyperhomocysteinemia (52.94%), alcohol (48.52%), hypertension (34%), family history (26.47%), obesity (23.52%). Other than these, two patients had chronic kidney disease stage 3, two female patients were irregular oral contraceptive pill users, one was diagnosed as systemic lupus erythematosus and another patient had anti phospholipid antibody syndrome.

40 patients were found to have abnormal blood sugars. Out of these 29 patients had fasting blood sugars > 126mg/dl and 11 had impaired fasting blood glucose (100-126mg %). Among the 36 diabetic patients with diabetes mellitus, 22 were previously diagnosed cases of diabetes mellitus, the remaining were diagnosed on the basis of repeated monitoring of blood sugars, with elevated blood sugars and abnormal HbA1C requiring insulin to control blood sugars. HbA1C was done in all patients. Among diabetics, 29 patients (80.55%) were found to have HbA1C >7.5%, 7 patients (19.44%) had HbA1C between 6.5-7.5%.

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23 patients (34%) had hypertension. Diagnosis of hypertension was made if the patient was a previously diagnosed case of hypertension or the diastolic blood pressure > 90mmHg or systolic blood pressure > 140mmHg on repeated measurement.

Dyslipidemia was found in 41 patients (60.29%). Out of these 41 patients, 32 patients had a total cholesterol >200mg%, 21 patients had triglycerides >150mg% and reduced HDL as lipid abnormality (<40mg% in male and <50mg% in female) was found in 27 patients. 36(52.94%) patients had the metabolic syndrome.

Positive family history was found in 18 patients (26.47%), 10 patients had first degree relative with history of myocardial infarction and the other 8 in second degree relatives. Out of the 7 patients with history of myocardial infarction in first degree relative, 5 had history of acute myocardial infarction in siblings (Brothers) at a young age (< 40years).

The youngest woman in our study was a 22 year old who was a known case of antiphospholipid antibody syndrome. This patient had a prior history of inferior wall myocardial infarction at the age of 18 years and was not on any anticoagulation therapy for more than one year. Coagulation profile was evaluated. Anti-nuclear antibodies and antiphospholipid antibodies were done in most of the patients. Interestingly one male patient was found to have Systemic lupus erythematosus at admission, with both anti-nuclear antibodies and dsDNA positive and one young female patient had antiphospholipid antibody syndrome. Homocysteine levels were done in all patients. 36 patients were found to have levels more than the upper limit (>15 IU/ml).

Two patients were known case of chronic kidney disease secondary to diabetic nephropathy and were on conservative management.

Among 40 patients (58.82%) with smoking as a risk factor, 17(42.5%) smoked about 6-10 pack years, 11(27.5%) smoked around 11-15 pack years, 9(22.5%) smoked 1-5 pack years and 3 (7.5%) smoked > 16 pack years.

Majority of the patients had an uneventful course, while 12 patients developed complications. Among 12 patients, 8(66.66%) were in Anterior wall myocardial infarction and 4 were in inferior wall myocardial infarction. One 40 year old newly diagnosed diabetic patient with anterior wall myocardial infarction had a left main block (100%). He remained in cardiogenic shock, and couldn't survive even after primary percutaneous intervention and died on the 3rd post infarction day. 6 patients had cardiac arrhythmias in the form of either ventricular tachycardia/ventricular fibrillation/Cardiac arrest/Complete heart block. Among these 6 patients, 3 patients (2 in anterior wall myocardial infarction and 1 in inferior wall myocardial infarction) had Ventricular tachycardia/Ventricular fibrillation/Cardiac arrest. All the patients were resuscitated successfully. Remaining 3 patients (2 in anterior wall myocardial infarction and 1 in inferior wall myocardial infarction) had complete heart block, of which one required temporary pacemaker. One of these patients with complete heart block was in heart failure (killips 2).

3 patients had heart failure (killips 2) and 2 patients were in cardiogenic shock. All of them recovered successfully.

DISCUSSION: This was a study of clinical profile of 68 young adults aged less than 40 years admitted in Goa Medical College and hospital with a diagnosis of acute myocardial infarction over a period of two years.

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The age, gender distribution, the clinical presentation, angiographic findings and the risk factors were fairly consistent with findings of other related studies.^{5,6,7,8} It was found that majority of patients were in the age group of 36–40 years. In a previous study on premature myocardial infarction, done by PA Tambyah et al,⁹ 32 patients were studied, whose ages ranged from 32 to 40 years. One center reported a 47 fold increase in the incidence of the first myocardial infarction in the similar age group in the last 20 years.⁸

In the current study, majority of young patients with myocardial infarction were male, which is consistent with Indian as well as international studies.^{5,6,8} Among 68 patients, 58 were male and 10 were female.

The prevalence of premature coronary disease has been reported to be 2-11% of all hospitalized myocardial infarction patients⁴. In the current study, the incidence of acute MI in young adults was 4.8% of all hospitalized myocardial infarction patients. This increase incidence has been attributed to an early exposure to some risk factors such as smoking and a predisposing lifestyle pattern. Smoking/tobacco use (64.70%), dyslipidemia (60.29%), metabolic syndrome (52.94%), Diabetes Mellitus (52.94%) and a positive family history of CAD (26.47%) were the risk factors of clinical significance.

The present study demonstrated that current smoking/tobacco abuse (64.70%) was the most common and significant modifiable risk factor associated with premature MI. Studies conducted by Goornavar et al¹⁰ and Schonenberger AW et al⁶ showed similar results. Among 40 smokers, 17 patients used 6-10 pack years, 11 patients used 11-15 pack years, 9 patients used 1-5 pack years and 3 patients used 16-20 pack years. .

Dyslipidemia was the next common risk factor, being documented in 60.29% of our study population. Other similar studies showed prevalence of dyslipidemia ranging from 10 to 60%. Goornavar et al¹⁰ found 54.5% and is in concordance with present study. The above differences in dyslipidemia as a risk factor in young AMI might probably be due to variation in the ethnic groups, geographical areas and the inclusion criteria. Most common lipid abnormality found in current study was the high total cholesterol level (> 200mg/dl) in 32 patients (47.05%).

In the present study, Hypertension and Diabetes mellitus was found in 33.82% and 52.94% of patients respectively, which is almost similar to that in the previous study by Goornavar et al.¹⁰ The incidence of Diabetes mellitus was relatively high in the current study. This may probably be attributed to the rising incidence of Diabetes in the study population. Among 36 patients (52.94%), 23 patients had antecedent Diabetes mellitus. Of these 23, 13 were diabetic since five years, 3 since three years, 5 since two years, 1 since one year and one was diagnosed six months ago. Of the known diabetics, 15 were on multiple oral hypoglycemic drugs and the remaining 8 were treated with insulin analogues for varying duration. Ten among these were also detected to be irregular on their medications. It was found that 18 of the known diabetic patients had poor control of their diabetic status, despite their treatment and only 5 patients had good control of diabetes, with HbA1c level < 7%.

Mean HbA1C among Diabetics and non-Diabetics was 8.4±1.65 and 5.9±0.24 respectively. Thus uncontrolled Diabetes Mellitus has to be considered to be a highly responsible risk factor for the premature CAD in the current study. Ayhan SS et al¹¹ showed similar findings in their study. This demonstrates the importance of maintaining an optimal HbA1C level.

Obesity (23.52%) was also found to be a clinically significant risk factor in our study. This in concordance with the study by Wong CP et al,¹² in which Diabetes Mellitus and obesity reflected the

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rising rate of metabolic syndrome in south-east Asia, which is increasingly recognized as a growing public health problem.¹²

Goornavar et al¹⁰ found family history of CAD 36%. Similar incidence (26.47%) was found in the present study. Of the 18 patients with a positive family history of acute myocardial infarction, ten were in the first degree relatives. One of these patients had history of fatal myocardial infarction in father and brother, both at young age. Six patients had history of acute myocardial infarction in their second degree relatives, all of them from the paternal side. This concludes that young myocardial infarction patients have strong family history of premature coronary artery disease, especially among the male relatives. It was also observed from previous studies that earlier the onset of first myocardial infarction, higher is the probability CAD in close relatives⁹.

Majority of the patients presented with typical chest pain. This was consistent with the study done by Schoenenberger AW et al in Switzerland⁶.

ST-elevation myocardial infarction (69.2%) was more common than Non ST- elevation myocardial infarction (30.8%) in the current study. This is in concordance with studies done by Schoenenberger AW et al⁶ (72%).

Schoeneberger AW et al⁶ and AI Khadra AH et al² demonstrated the high incidence of morbidity and mortality in Anterior wall myocardial infarction compared Inferior wall myocardial infarction, as evidenced by a larger infarct size, lower admission left ventricular ejection fraction, higher incidence of heart failure, serious ventricular ectopic activity, in-hospital death and total cumulative cardiac mortality. Our study also demonstrated a similar trend in the form of severe left ventricular dysfunction in anterior wall myocardial infarction patients (30.43%) compared to Inferior wall myocardial infarction patients (13.63%). We observed regional wall motion abnormality in 63.23% of patients and this was in concordance with the study by Zhahid H et al⁵ (82%).

Most of young MI patients in the present study showed atherosclerotic changes in Coronary angiography. Such a finding was also demonstrated by Tambyah PA et al.¹² Angiographic profile showed predominantly single vessel disease in 55.55% in our study, as compared to studies by Goornavar et al¹⁰ (68%), and Schoenenberger AW et al⁶ (75%). Left anterior descending remains the most common infarct related artery (57.40%) in the current study. This is in concordance with studies by Goornavar et al¹⁰ (72%). We would like to stress on higher incidence of multi-vessel disease. Double vessel disease and triple vessel disease were found in 29.62 % of the patients, which is relatively high compared to the data of previous studies. This may probably be attributed to higher incidence of early onset of diabetes mellitus in our study population...

Interestingly, 8 (14.81%) patients showed normal coronary arteries at coronary angiography. This is similar to the study by Sozzi et al,¹³ which showed 16.5% of patients had normal coronaries. Of these, six patients had ST- elevation myocardial infarction, two patients had Non ST-elevation myocardial infarction. None of the patients in this group had any acute myocardial infarction related complications. Of these eight patients, six were smokers. Hyperhomocysteinemia was found in seven of these patients and other procoagulant state workup was normal in all. At an individual level, the number of risk factors was less compared to those with abnormal coronary angiogram patients.

Prothrombotic state was evaluation revealed the following findings. One patient was diagnosed Systemic lupus erythematosus at admission. Another young female patient with previously diagnosed anti-phospholipid antibody syndrome presented with anterior wall myocardial infarction. There was a history of stopping anticoagulant treatment over past one year. The same lady had a previous history of inferior wall myocardial infarction four years back. Hyperhomocysteinemia as a

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risk factor was detected in 52.94% of patients; a similar incidence of hyperhomocysteinemia was demonstrated by Verender et al⁷ (66%).

Majority of young acute myocardial infarction patients in the current study had a good clinical outcome with minimal complications. In-hospital mortality, in a recent study by Indramohan V et al¹⁴ was 1.7% and it is in concordance with present study (1.5%). Survival after myocardial infarction is influenced by multiple factors, of which age is a favorable non-modifiable predictor of long term prognosis. Short and medium term prognosis in young myocardial infarction survivors is known to be excellent. The probable explanation of the above findings may be attributed to early medical attention because of typical symptoms and because of the lower prevalence of extensive CAD in them. This was demonstrated in the study by Hosseini et al¹⁵. The current study demonstrated single vessel disease in 55.55% of patients and a similar observation was made in the study by Hosseini et al.¹⁵

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Risk factors	Present study	Goornavar et al ¹⁰	Chun pong wong et al ¹²	ArumallaVeerender et al ⁶	Schoenenberger et al ²¹	HassanZhahid et al ⁵
Smoking/tobacco abuse	64.7	77.4	74	68	77.2	78
Dyslipidemia	60.3	54.5	20.0	34	44	48
Hypertension	34	46	28.5	16	17.8	40
Obesity	23.5	18	37		57.8	
Diabetes mellitus	52.9	27.2	16.5	14		
Family history	26.5	36		8	55	52
Alcohol	48.5			44		
SLE	1.5					
OCP use	2.9					4
Hyperhomocysteinemia	52.9			66		

Table 1: comparison of risk factors among the present study and studies conducted in the past

Type of MI	Present study	Hassan Zahid et al ⁵	Goornavar S M et. Al. ¹⁰	Sanchez et al ¹⁰	Al-Khadra AH ²
Anterior wall MI	67.6%	50%	54%	MOST	MOST
Inferior wall MI	32.4%	36%	27%		

Table 2: Comparison between the type of myocardial infarctions among various studies

Vessel affected	Present study	Goornavar et al. ¹⁰	Venkataramulu et al. ¹	Kaul et al. ¹⁰	A W Schoenenberger et al. ⁶
SVD	55.55%	68%	26.66%	38.8%	75%
DVD	20.37%	22.5	6.66%	26.2%	23.2%
TVD	9.25%	09%		40%	
LAD	57.37%	72%			
LCX	20.37%	27%			
RCA	14.81%	45%			
NORMAL	14.81%	-	66.66%		1.8%

Table 3: Comparison of predominant vessel involved in Myocardial infarctions in the young as seen on Coronary angiograms

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