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Original Research Article

A study on risk factors, complications and management outcome of myocardial infarction in patients of age below 40 years

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Abstract

Background: Acute myocardial infarction (AMI) was believed to be an uncommon entity in the young, of late there has been a rising incidence in this group of population. The present research was undertaken to study the type of MI**,** cardiac enzyme markers**,** relative incidence of risk factors**,** complications and outcome of MI in young patients.
Method: Total 50 patients of aged 40 years or younger, who were diagnosed to have acute MI, were enrolled in the study during the period from 1st Jan 2017 to 31st Dec 2018. A detailed history was taken; thorough clinical and diagnostic evaluation, ECG and echocardiography were done along with angiography. Patients were managed accordingly.
Results: The mean age of patient was 34.16±4.81 years, ranged from 20-40 years with male predominance (88%). Typical chest pain (88%) was the most common presentation. Anterior wall MI was most frequent location of MI on ECG (48%). Cardiac biomarker, CPKMB was elevated in 90% and TROP I in 94%. All patients had atherosclerotic disease on coronary angiogram. Single vessel disease was the most common feature (76%). Smoking (68%), dyslipidemia (64%) and metabolic syndrome (38%) were most common risk factor. 76% patients underwent primary PTCA and stenting, 16% underwent thrombolysis, 4% underwent rescue PTCA following failed thrombolysis. Complications in young MI were minimal (12%) with good outcome in majority (94%).
Conclusion: It can be inferred from the above results that MI in young has certain typical features in terms of presentation and risk factors, many of which are be readily modifiable.
Keywords: Myocardial infarction, Cardiac biomarker, Atherosclerotic, Dyslipidemia, Thrombolysis.

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1. Introduction

Nowadays, cardiovascular diseases (CVDs) have become the leading cause of mortality in developing countries including India [1]. Compared with whites, individuals of South Asia demonstrate onset of coronary heart disease (CHD) at a younger age and are often diagnosed with CHD before the age of 40 years [2]. Acute myocardial infarction (AMI) is one of the most common presentations of coronary artery disease (CAD) [3]. AMI is less frequent in young adults (≤ 45 years) than in older individuals (> 45 years) as it occurs in only 2% to 6% in the younger population [4]. In recent years, the rate of AMI in young adults has begun to rise. About 25% of acute MI in India occurs under the age group of 40 and 50% under the age group of 50. One center reported a 47 fold increase in the incidence of first MI under the age of 40 in the last 20 years [5]. However, the consequences of MI can be devastating particularly at a ‘‘young’’ age due to its greater potential impact on the patient’s psychology, ability to work and the socioeconomic burden [6].

The increased prevalence in young adults can be partly attributed to the increased prevalence of risk factors for atherosclerosis among the population under the age of 40 [7]. Risk factor analysis in young patients with AMI has identified a high prevalence of current smoking, hyperlipidemia, and family history compared with that found in older patients; however, the most important modifiable risk factor is smoking [8-10].

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. Successful thrombolysis in hypercoagulable states has been reported in literature. There are also reports of successful percutaneous transluminal coronary angioplasty (PTCA) with or without coronary artery stenting in the antiphospholipid syndrome. In those with MI secondary to accelerated premature atherosclerosis, early intervention with primary angioplasty has an improved outcome over thrombolysis [11]. These observations are important for the primary prevention and adequate management of such diseases [12].Hence the present study was carried out to study the type of MI, cardiac biomarker, risk factors, complications and management outcome of myocardial infarction in patients of age below 40 years.

2. Materials and Methods

The present descriptive observational study was carried out in the Department of Medicine, at Tertiary care centrein Maharashtra during the period from1st Jan 2017 to 31st Dec 2018.Total 50 patients of aged 40 years or younger admitted with a diagnosis of acute MI were enrolled in the study. Most published studies have used a cut off point of 40 years and below to define young MI, hence in this study patient in the age 40 years and below were included. The final diagnosis of acute MI was based on two of the following criteria [13]-

1) Ischemic chest pain for at least 30 minutes
2) ECG evidence of myocardial injury: 0.1 mv or more ST segment elevation in 2 contiguous leads or 0.1mv or more ST depression or definite T-wave inversion or both.
3) An increase in serial CKMB or serial troponin.

Patients with aged < 18 years, those patients 40 years or younger with acute MI who refused to give their written informed consent for the study and patient who were not wished to continue in the study after giving the consent were excluded from the study.

A detailed history was obtained and thorough clinical examination and diagnostic evaluation was recorded with the help of case record form. Patient were interviewed (or their relatives) who were eligible for study. All invasive and non- invasive procedure were least likely to cause harm to the patients, still all procedures was explained to patients and informed consent was taken from every selected case.All ethical considerations and necessary approvals were taken. The weight and height measurements were converted into body mass index BMI=weight (kg)/ (Height meteres) [14]. ECG and echocardiography was done along with angiography. Patients were managed accordingly.

2.1 Statistical Method

The collected data were analyzed with the help of SPSS (version 20) for Windows package (SPSS Science, Chicago, IL, USA). The description of data was done in form of arithmetic mean ± SD for quantitative data while in the form of frequencies (%) for qualitative (categorical) data. *P*-values of< 0.05 were considered significant. For comparison of categorical variables (i.e. to examine the associations between qualitative/quantitative variables), chi-square test was used if the number of elements in each cell are 5 or higher and Fisher's exact test, otherwise. To compare proportions between two independent groups Z test of proportions was used. Risk factor analysis was done using odds ratios (OR) along with their respective 95% confidence intervals (CI) for finding risk factors of under-nutrition.

3. Observations and Results

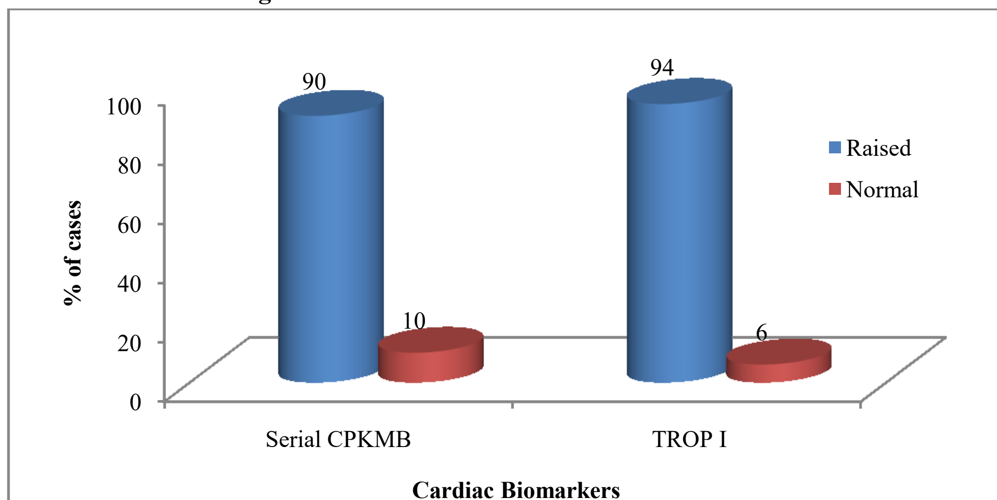
A total of 50 subjects confirmed to have myocardial infarction were included in the study, among them 44 (88%) were males and 6 (12%) were females. The mean age of patient was 34.16±4.81 years, ranged from 20-40 years. Majority of patients (28; 56%) belonged to age group of 36-40 years followed by 30-35 years (17; 34%). Most of the patients (72%) had an increased BMI, only 14 (28%) patients had a normal BMI. Out of 50 patients, 18% patients belonged to lower class, 52% in middle class and 30% patients were from lower middle class. Majority of patients presented with typical chest pain (88%) and 12 % presented with atypical symptoms. Types of MI or ECG findings with respect to involved region are shown in table 1.

Table 1: Type of myocardial infarction (MI)

Site of MI	No. of Patients	Percentage
Anterior Wall MI (AWMI)	24	48%
Anterolateral Wall (ALWMI)	3	6%
Anterior+Inferior Wall (AWMI+ IWMI)	1	2%
Anteroseptal Wall (ASWMI)	3	6%
Inferior Wall (IWMI)	19	38%
Total	50	100%

Cardiac biomarker, CPKMB was elevated in 90% and TROP T in 94% of patients as shown in figure 1.

Figure 1: Results of cardiac biomarkers



Smoking was the most common risk factor contributing to 68% as shown in table 2. Among 50 patients, 36 (72%) had increased total cholesterol, 46 (92%) had increased triglyceride (TG), 5 (10%) had increased LDL and 6 (12%) had decreased HDL levels, (Figure 2). Majority of patients, 52% (>15= 26) have raised Sr. Homocysteine level. Hypercoagulable state was not found to be a risk factor.

Table 2: Risk factor for Myocardial infarction

Risk factor		No. of Patients	Percentage
Smoking		34	68%
Alcoholism		20	40%
obesity		19	38%
Metabolic syndrome		19	38%
Family history	Ischemic Heart Disease	2	4%
	Diabetes	13	26%
	Hypertension	14	28%
CKD		2	4%
CVA		0	0%
Thyroid disorder		0	0%

All patients had regional wall motion abnormality on Echocardiogram with majority having mild to moderate left ventricular (LV) systolic dysfunction, (Table 3). Normal LV systolic function (EF >50 %) were seen in 12 (24%) patients and other echocardiographic findings in each type of MI are depicted in table 3.

Table 3: Echocardiographic findings in each type of MI

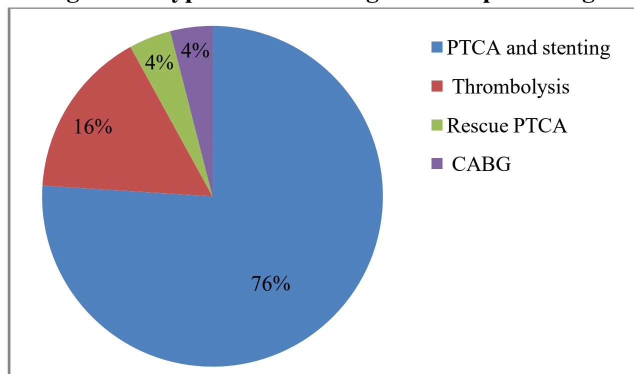
LV systolic function	AWMI	IWMI	ALWMI	ASWMI	AWMI+IWMI	Total
Severe LV systolic dysfunction (EF<30 %)	3	0	0	0	0	3 (6%)
Moderate LV systolic dysfunction (EF 30-40%)	8	4	1	1	0	14 (28%)
Mild LV systolic dysfunction (EF 41-50%)	7	11	2	0	1	21 (42%)
Normal LV systolic function (EF >50 %)	-	-	-	-	-	12 (24%)

47 patients underwent coronary angiogram and all these patients had atherosclerotic disease. 3 patients did not give consent for coronary angiogram. 38 patients (76%) had single vessel disease (SVD), 6 (12%) had double vessel disease (DVD) and 3 (6%) patients had triple vessel disease (TVD).

Types of treatment given were shown in figure 2. Majority of patients(38; 76%) underwent PTCA and stenting, 8 (16%) underwent thrombolysis, 2 patients had to undergo rescue PTCA as one patient developed hypersensitivity reaction and one had failure of thrombolysis. 2 patients with TVD underwent CABG. One

patient did not undergo either thrombolysis as he presented too late for thrombolysis, or PTCA could not be done as he had developed acute renal failure. He was treated with antiplatelet agents. Complications occurred in 12% of cases. These were malignant arrythmias, cardiogenic shock, pulmonaryoedema. Death occurred in two patients (4%).

Figure 2: Type of treatment given and percentage



4. Discussion

Myocardial Infarction (MI) is an uncommon disease in young individuals and the incidence of MI in ‘‘young’’ patients is substantial. The Yunyun *et al* [15] said that AMI tend to occur suddenly in young patients; most young people do not experience a warning before its onset, and the first occurrence often leads to a large infarction size [16, 17]. Zimmerman *et al* [18] reported that males show an absolute predominance among young AMI patients; however, there is a tendency for the incidence of myocardial infarction to be equal in both sexes with increasing age. The skewed gender distribution among males (88%) vs. females (12%) of the study population is attributed to the protective effects of estrogens in preventing atherosclerosis and prevalence of smoking which was much more common amongst male that has been clearly demonstrated in Indian as well as international studies [19-21]. It was found that majority of patients were in the age group of 36–40 years which is comparable with the study done by Patel *et al* [22]. The mean age of patient was 34.16±4.81 years which is closely similar to the study done by Desai and Chandrakala [23].

Several studies reported that chest pain is the most frequent symptom in young AMI patients [24, 25].].Similarly in present study typical chest pain was the most common symptom observed. The most common anatomical location for the MI was the anterior wall (48%). Patients with a complicated presentation like malignant arrhythmias and cardiogenic shock had AWMI. These findings are well correlated with the previous studies [23, 26, and 27].

All reported data show that smoking is the commonest risk factor encountered in young patients with acute MI [18, 28]. 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 [29, 30]. 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% [31, 32]. In the current study, among various risk factors, smoking was found to have strongest association with MI, which was present in 68% of the patients. Smoking of 20 cigarettes a day or more is associated with two folds increase in risk of MI. This finding is comparable with the other studies [22, 23, 25, 33]. Dyslipidemia was the next common risk factor, being documented in 64% of our study population. Other similar studies showed prevalence of dyslipidemia ranging from 10 to 60% [33]. 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 was the triglycerides level (> 150mg/dl) in 46 patients (92%).Females also have risk factors associated with MI. Females have risk in descending order as obesity and metabolic syndrome followed by HTN, followed by alcoholism then smoking followed by DM.

All the patients showed atherosclerotic changes in coronary angiography and such a finding was also demonstrated by Patel *et al* [22] and Tambyah *et al* [34]. Angiographic profile showed predominantly single vessel disease in 76% cases, as compared to studies by Goornavar *et al* [33] (68%), and Schoenenberger *et al* [35] (75%). Left anterior descending was the commonest vessel involved, this is in concordance with study done by Goornavar *et al* [33].

Majority of patients had a good clinical outcome with minimal complications. In-hospital mortality, in a recent study by Desai and Chandrakala [23] was 6% and it is in concordance with present study (4%). 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 al* [36].

5. Conclusion

Myocardial infarction in less than 40 years of age is almost exclusively seen in male. The chest pain was the most common clinical presentation and AWMI was the commonest type of MI. Smoking was the most common risk factor of MI which was seen in young adults followed by dyslipidemia. A majority of the patients had single vessel disease which was seen on coronary angiography. Complications were minimal with good outcome in majority.

The present study suggested that 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. There is a need to increase awareness among the young population regarding the entity of MI hence stressing on modifying life style in terms of healthy diet, exercise, avoiding smoking and screening for risk factors in those at high risk. This simple measure can make a large difference in preventing the occurrence of MI in young.

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