



A Study of ST-Elevation Acute Myocardial Infarction (STEMI) in Youngs

KEYWORDS

Young, STEMI, Myocardial infarction, Male, Smoking, Hypercholesterolemia.

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ABSTRACT

Introduction: Ischemic heart disease is emerging as a cause of morbidity and mortality, in developed industrialized world and for several decades it is an increasing cause of the same even in developing nations like India. Previously it was the disease of elderly having history of hypertension, long standing diabetes, atherosclerotic vascular disease, obesity etc. Myocardial infarction among the young is somewhat preventable and treatable as emergence of risk factors is partially or totally reversible among this population subgroup. So, studying the risk factors to prevent this life threatening disease and complications to add to our knowledge the ways to prevent and manage them is the aim of this study. **Material & Methods:** All patients having acute STEMI, who are up to 40yrs of age are included and all the workup was done, follow up examination was also done. **Results:** AMI constituted about 4.0% of total adult young patients <40 years. Maximum incidence of MI was found in the age group of 30-40 years. The incidence is significantly higher among males as compared with females with male: female ratio 24:1 in patients <40 years. This is due to higher prevalence of smoking in males in India. Commoner patterns of wall involvement were extensive antero-lateral wall (34%) and inferior wall (32%). Incidence of RVTMI (6%) and that of P/WMI (2%) were significantly low and they don't occur in isolation without involvement of inferior wall. **Analysis:** The early presentation is much commoner. Typical retrosternal chest pain with radiation to left arm (98%), diaphoresis (46%) and dyspnoea (30%) were commoner symptoms. Incidence is high among the patients with smoking (78%), obesity (20%) and type A personality (26%). In hospital (6.0%) & post discharge (0%) mortality are lower as compared to those in older patients-9% (in 45-70yrs.) & 21.4% (in >70 yrs.) in hospital mortality & 10.3 (in 45-70yrs.) & 24.4% (in >70yrs). Incidence of recurrence is highest within first 2 months (66.66%). **Discussion:** STEMI in young population is highly preventable and avoidable disease. Patient can be salvaged and better life can be offered, if proper care is taken in the management of the disease. Incidence of recurrence is highest within first 2 months (66.66%). So, regular follow-up and adherence to secondary prophylaxis is essential.

INTRODUCTION

Ischemic heart disease is emerging as an cause of morbidity and mortality, in developed industrialized world and for several decades it is an increasing cause of the same even in developing nations like India.

Myocardial infarction is one of the most severe forms of ischemic heart disease, especially in acute settings. Consequences of MI are from arrhythmias and myocardial pump failure to cardiogenic shock and sudden cardiac death.

Previously it was the disease of elderly having history of hypertension, long standing diabetes, atherosclerotic vascular disease, obesity etc. But at present incidence and prevalence is increasing among the young adults due to prevalence of smoking, early onset of risk factors like diabetes hypertension and atherosclerotic vascular disease in addition of obesity, sedentary life style etc. and is amongst the leading causes of morbidity and mortality even in young people.

Increased incidence if myocardial infarction among the young poses a significant burden over one's own life, family, society and nation as it is the most active, working subpopulation as well as carrying the burden of people in extremes of age as well as whole society.

Myocardial infarction among the young is somewhat preventable and treatable as emergence of risk factors is partially or totally reversible among this population subgroup.

Identifying and studying the etiology and risk factors of myocardial infarction among the young population may throw more light on this new emerging threat and make us more aggressive in attempting to primordially, primarily and secondarily prevent this debilitating disease in socially, economically, sexually, physically and mentally active subpopulation to serve and protect the individual, family, society as well as nation from this disability and handicap.

The patterns of clinical features as well as complications are more precise in this subgroup and though complications are commoner they are more tractable, treatable and preventable. So early treatment and monitoring prevents mortality and decreases morbidity.

So, studying the risk factors to prevent this life threatening disease and complications to add to our knowledge the ways to prevent and manage them is the aim of this study.

Aims & Objectives:

1. To study the risk factors of acute STEMI in young patients <40 yrs.
2. To study the pattern of clinical presentation of young patients (<40 yrs), presented with acute STEMI.
3. To study the profile of different complications in young patients (<40 yrs), presented with acute STEMI.

MATERIAL AND METHODS

The present study includes 50 confirmed cases of ST elevation myocardial infarction in adult patients up to 40yrs of age during the period of May, 2007 to Feb. 2010

Inclusion Criteria

1. All patients having acute STEMI, who are up to 40yrs of age.
2. Cases satisfying the following parameters for MI were included in the study, according to ACC/AHA guidelines of diagnosis of AMI:
 - Characteristic chest pain
 - ST elevation >0.1mV in any two consecutive leads
 - Cardiac biomarkers (CK-MB, cTnI)

Evaluation

Evaluation of patient fulfilling the criteria done in the following way;

- Clinical symptoms (chest pain, dyspnoea, diaphoresis etc.)

•Signs like vitals (pulse, BP measurement) & systemic examination

Investigations Done

The laboratory investigations carried out included:

1. Complete blood count
2. RBS, RFT, LFT, Urine (routine, micro.)
3. Fasting lipid profile
4. Chest X-ray
5. 12 lead ECG
6. Cardiac biomarkers(CK-MB, cTnI)
7. 2D- echocardiography with colour Doppler
8. hsCRP
9. ANA
10. APLA & ACLA
11. Serum Homocysteine level
12. Serum Fibrinogen level
13. Coronary angiography

Treatment

All patients who present within 12 hrs of symptom onset and hyperacute changes on ECG were given reperfusion therapy in form of either thrombolysis or primary PCI in addition to antithrombotics, nitrates, beta-blockers, ACEI and statins (except the patient with confirmed aortic dissection on CT aortogram). Electrical defibrillation, transvenous pacing were done when needed in several patents.

Complications

Complications in form of pump failure(LV dysfunction, CHF, cardiogenic shock); arrhythmias (ventricular tachyarrhythmias, supraventricular tachyarrhythmias, AV blocks, intraventricular conduction disturbances); mechanical complications (VFWR, VSR, acute MR, LV aneurysm); LV mural thrombosis; pericarditis; post MI syndrome etc. have been noted and studied.

Prognosis

Prognosis in form of survival & mortality within the duration of hospital stay, 1 month & 1 year had been evaluated.

RESULTS

The present study includes clinical evaluation of 50 young adult patients (<40yrs), hospitalized and discharged or expired; diagnosed as having acute STEMI during the period of May 2007 to February 2010.

Patients with <40 yrs of age with clinical diagnosis constituted about 4.0% of total admission in hospital during study period.

Age(yrs)	No. of patients	Percentage (%)
<20	1	2
20-30	4	8
30-40	45	90

Table-1 Incidence of MI in relation to age distribution

Table-1 illustrates that maximum no. of patients were observed in age group of 30-40 yrs. Due to accumulation of smoking related risk of coronary events and atherosclerosis.

Sex	No. of patients	Percentage (%)
Male	48	96
Female	2	4

Table-2 Incidence of MI in relation to Sex distribution

Table-2 reveals that out of 100, 96 were males and 4 were females due to more prevalence of smoking in males in India.

Most (98%) of the young patients (<40yrs) presented with typical chest pain.

Time since onset of symptoms	No. of patients	Percentage (%)
<30 min	5	10

30min to 2hrs	15	30
2 to 6 hrs	24	48
6 to 24 hrs	3	6
>1 day	3	6

Table-3 Distribution of time of presentation since onset of symptoms

Most of the patients (48%) present between 2 to 6 hrs, while 40% before that and 12% after that. Among them 10% were presented within 30 minutes of symptom onset and 6% after 1 day.

Symptoms	No. of patients	Percentage (%)
Typical chest pain	49	98
Atypical chest discomfort	01	02
Dyspnoea	15	30
Perspiration & Diaphoresis	23	46
Altered sensorium	1	2

Table-4 Clinical symptoms on presentation

Typical chest pain (98%), dyspnoea (30%) and perspiration and diaphoresis (46%) were common clinical features.

Incidence was high among the patients having hypertension (18%), diabetes (8%) and history of ischemic heart disease (6%).

Incidence is high among the patients with smoking (78%), obesity (20%) and type A personality (26%).

Distribution of Clinical Signs

There is 22% of patients were presented with tachycardia and 4 % of those with bradycardia, while the remaining 74% had normal heart rate.

32% were having hypertension at the time of presentation and 6% had hypotension, while the remaining 62% were normotensive at the time of admission. 30% of the patients had signs of heart failure in form of raised JVP, S3, crepitations etc.

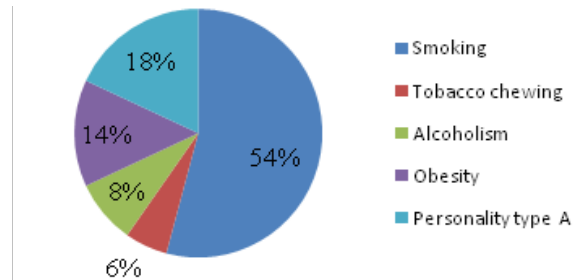


Figure-1 Risk Factors

Signs	No. of patients	Percentage (%)
Tachycardia	11	22
Breadycardia	2	4
Hypertension	16	32
Hypotension	3	6
Raised JVP	2	4
S3	4	8
Crepitations	9	18
Murmurs	1	2
Hepatosplenomegaly	0	0
Encephalopathy	1	2

Table-5 Clinical signs on presentation

Most (96%) of patients were presented within hyperacute phase.

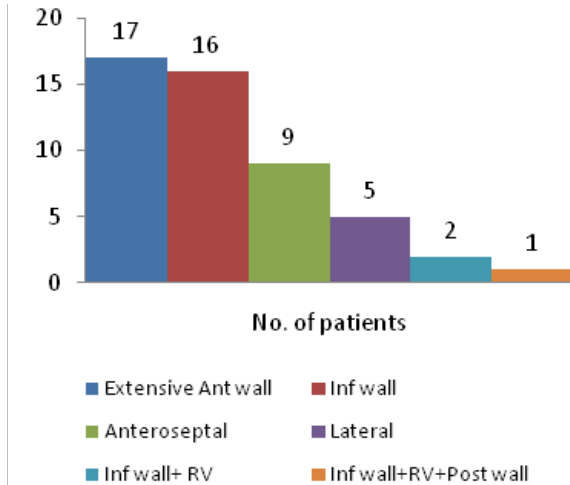


Figure-2 ECG Changes

Most (96%) of the patients were presented within hyperacute phase.

Metabolic derangements	No. of patients	Percentage (%)
Hyperglycemia (>110mg/dl)	19	38
Dyslipidemia (LDL>100mg/dl)	37	74
Dyselectrolytemias	0	0
Altered renal functions (S_creat.>1.4mg/dl)	1	2
Altered liver functions	0	0

Table-6 Metabolic derangements

Table-6 shows the high prevalence of dyslipidemia (74%) & hyperglycemia among young patients who developed MI in young age(<40yrs).

Risk Marker	No. of patients	Percentage (%)
LDL>100mg/dl	37	74
hsCRP>3mg/dl	50	100
S. Homocysteine >10micromol/L	49	98
ANA>0.9mg/dl	1	2
APLA & ACLA>15mg/dl	1	2
Hyperfibrinogenemia (>340 mg/dL)	43	86

Table-7 Risk markers in young STEMI

The Table-7 shows that incidence of raised hsCRP, hyperhomocysteinemia, raised LDL & hyperfibrinogenemia are higher (100%,98% & 74%,86% respectively) in those patients who suffer from MI in relatively younger age(<40yrs).

10% of the patients had significant pulmonary oedema on chest X-ray. All patients had some regional wall motion abnormality but 46% developed significant left ventricular dysfunction (EF<40%).

Finding on CAG	No. of patients	Percentage (%)
Normal	2	4
Single Vessel dis	37	74
Double Vessel dis	8	16
Triple Vessel dis	1	2

Table-8 Findings on Cardiac catheterization

Amongst the young patients, on coronary angiography; the incidence of single vessel disease is highest (78%) while that of triple vessel disease is low (2%). CAG has not been done in one patient as 2D-echocardiography and CT-aortogram were suggestive of aortic dissection from root to the origin of left subclavian artery. In addition CAG has not been done in a patient who died of cardiac arrest immediately after admission.

Among complications, highest rate of complications was due to arrhythmias (12%), heart failure (Killip grade 2 or more) (12%) and cardiogenic shock (6%). One patient developed bleeding complication in form of hematemesis consequent to thrombolysis. One patient had neurological complication in form of hypoxic ischemic encephalopathy due to circulatory failure.

Most of the patients develop complications early, ie: 62% within 1 hr and 31% within 1 to 6 hrs of presentation, while incidence of the same after 1 day is significantly low.

The incidence of recurrence was 6% within 2 yrs follow-up, with most case occurring within 1 year.

DISCUSSION

Higher prevalence in males which is comparable to previous studies like Hoit et al Thrombophilia study Kyoto Risk Study. Male: female ratio in incidence goes on decreasing as age advances as per cumulative analysis of the study.

In Hoit et al.³ Male gender (92%), smoking (82%) and family history of IHD (42%) were strongly associated with young STEMI. In Thrombophilia study⁴ also the Male gender (92%), smoking (85%) and hypercholesterolemia (76%) found to be associated with young STEMI.

Younger patients with MI have no significant predilection for any region of myocardium as revealed in different studies which is comparable to Hoit et al³ and Gregorio Caimi et al. There is no variation in pattern of involvement of different regions of myocardium in younger patients from the middle aged and older ones which is also reflected in Hoit et al.³ Different signs of heart failure are present in 14% on chest x-ray and 46% on echocardiography while those are 44% and 65% respectively in other studies. Evidence of heart failure on chest x-ray like cardiomegaly and pulmonary oedema and findings of decreased EF in echocardiography are lesser in younger age group with MI as compared to middle aged and older patients with MI in previous studies. (Hoit et al³)

CAG	Present study (%)	Hoit et el. ³ (%)	Gregorio Caimi at el ⁶ (%)	Kyoto Risk Study ⁵ (%)
Normal	4	15	25	3.8
SVD	74	49	42	76.9
DVD	16	18	25	15.4
TVD	2	18	00	3.8

Table-8 Coronary involvement on CAG

Table-8 suggests higher incidence of MI with normal coronaries and single vessel disease in contrast to lesser incidence of multi-vessel disease. Most patients were having single vessel disease in present as well as previous studies.

Table-9 shows that electrical and mechanical complications have lesser incidence in young patients in present study as compared to that in middle aged and older patients with MI in previous studies. Chances of extension of infarct as well as reinfarction are almost same in younger patients in present study and middle aged and older individuals in previous study.

Complication	Young patients in present study (%)	Middle aged Hoit et el. ³ (%)	Older patients on Hoit et el. ³ (%)	Kyoto Risk Study ⁵ (%)
Arrhythmias	16	33	28	-
CHB	2	6	10	-
Heart failure	12	54	71	-
Cardiogenic shock	6	3	5	-
MR	0	-	-	2
VSR	0	-	-	0
VFWR	0	-	-	0

Post infarct angina	0	32	28	-
Extension or ReMI	6	6	7	12.4

Table-9 Complications in young & old

Younger patients with MI have lesser short term and long term mortality in present study as compared to that in middle aged and older patients in previous studies. (Hoit³, Kyoto⁵, PRIAMHO II Study)

CONCLUSIONS

AMI constituted about 4.0% of total adult young patients <40 years. Maximum incidence of MI was found in the age

group of 30-40 years. The incidence is significantly higher among males as compared with females with male: female ratio 24:1 in patients <40 years. This is due to higher prevalence of smoking in males in India. Incidence is high among the patients with smoking (78%), obesity (20%) and type A personality (26%). So, education regarding smoking cessation and deaddiction therapy regarding the same may help in reducing the incidence of MI in young patients <40 years. This suggests that absolutely normal clinical examination does not rule out AMI. Incidence of recurrence is highest within first 2 months (66.66%). So, regular follow-up and adherence to secondary prophylaxis is essential

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