International Journal of Innovative Research in Medical Science (IJIRMS)
Volume 01 Issue 09 Nov 2016, ISSN No. – 2455-8737
Available online at - www.ijirms.in

Open Access Journal www.ijirms.in ISSN - 2455-8737

Acute Myocardial Infarction among Young Adults in India: Clinical Profile and Risk Factors

Mulay Pramod Pz[*1], Mulay Surekha P[1], Hanchate Milind S[2]

[*1]Pulse Cardiac Care Hospital, Latur
[2]Port Health Organisation, Mumbai

Abstract:

Introduction: *The growth of cardiology as a specialty may be explained by a study of the attention given to acute myocardial infarction. The incidence of coronary artery disease and acute myocardial infarction has been recognized in the younger age group more frequently in the recent years. Increasing frequency among young individuals has led to the entitling "Coronary artery disease in young (CADY)". Present study was done to study the IHD in young patients with* ***objectives*** *to study the (1) clinical profile of myocardial infarction in young patient of age group 45 years and below and (2) conventional and newer risk factors for myocardial infarction in young age.*

Material & Methods: *Present study was a hospital based descriptive study conducted in a tertiary care hospital of Mumbai. Total 45 patients of acute myocardial infarction of age group 45 years and below, were studied with reference to clinical profile and risk factor analysis.*

Results: *In present study out of 45 patients more than 80% were male, 35% were in the age group of 41-45 years and only 6% were below 30 years age. In the present study 46% of patients belonged to physically more active group. In the present study the highest incidence of infarction was in social class II and III constituting 66.67%. Smoking was one of the important risk factors for AMI in this study, present in 55.56% of patients. Type-A personality was noted in 16 patients (35.36%). Apart from conventional risk factors two cases of structural aortic disease, one case each of increase dLp(a) level, Hyperhomocysteinemia and protein-c deficiency had been noted as risk factors as newer risk factors.*

Conclusions: *In young patients with AMI majority of the patients belong of the age group between 36-45 years. Newer risk factors are commonly associated with AMI at young age.*

Keywords: ***CAD, CADY, Newer Risk Factors, AMI, Epidemiology, Hyperhomocysteinemia.***

Introduction:

The growth of cardiology as a specialty may be explained by a study of the attention given to acute myocardial infarction[1]. Stoke in 1854 summarized the prevalent view when he wrote in that coronary obstruction "Is probably not infrequent but a cause of angina, its action is remote existing unnecessary"[2,3].

Pathologists believed that coronary arteries were end arteries and that occlusion must always lead to sudden death[4]. This belief was perpetuated by Sir William Osler by writing that "The symptoms of coronary vessels are not very characteristic, it is only rarely diagnosed during life".

Ischemic heart disease is a disease spectrum of diverse etiology with the common factor being an imbalance between myocardial oxygen supply and demand[5]. This imbalance is usually related to either an absolute reduction in coronary blood flow or an inability to increase coronary blood flow relative to the needs of the heart and is most often due to coronary arteries. Myocardial infarction in together with sudden cardiac death and angina pectoris is one of the three major manifestations of Coronary Artery Disease (CAD)[1,5].

The incidence of coronary artery disease and acute myocardial infarction has been recognized in the younger age group more frequently in the recent years. Increasing frequency among young individuals has led to the entitling "Coronary artery disease in young (CADY)". The epidemiology, clinical and pathological data indicates that 3-8% of myocardial infarction occurs under the age of 45 years. It is known that the incidence of IHD is more common in urban population. This may be due to lack of physical activity, high caloric intake, sedentary habits and effects of modem stress on residents of big cities. Differences in epidemiological factors in urban and rural population are already well known[5-7].

***Corresponding Author: Dr. Pramod Pandurang Mulay,** Director, Pulse Cardiac Care Hospital, Latur*

It is known that the incidence of IHD is more common in urban population. This may be due to lack of physical activity, high caloric intake, sedentary habits and effects of modem stress[6,7].

CAD in young adults may differ from that in elderly in virtue of its greater incidence of other than atherosclerotic etiology, the heavy preponderance of the male patients and better prognosis.

Rising incidence of CAD is not due to genetic susceptibility but due to inter population differences in environmental factors and differences in mode of life[6-8].

Besides conventional risk factors for CAD many new risk factors for CADY are being identified, to mention a few lipoproteins mainly HDL, LDL, Lp(a), homocysteine, fibrinogen, inflammatory factors CRP, infections. Over a period of time, rise in SGOT, SGPT, LDH and CPK levels are being more commonly replaced by CPK MB, CPK-MB iso-form ratio, bedside Trop-T, and new modalities of imaging[8,9].

Present study was done to study the IHD in young patients with following objectives,

Objectives:

1. To study the clinical profile of myocardial infarction in young patient of age group 45 years and below.
2. To study the conventional and newer risk factors for myocardial infarction in young age.
3. To study the correlation of risk factors with clinical severity of myocardial infarction. .
4. To study serum lipo-protein profile in young patients.

Material and Methods:

Present study was a hospital based descriptive study conducted in a tertiary care hospital of Mumbai. Total 45 patients of acute myocardial infarction of age group 45 years and below, were studied with reference to clinical profile and risk factor analysis.

Inclusion Criteria:

Young patients of age 45 years of less with definite evidence of acute myocardial infarction were included in the study.

Diagnosis of myocardial infarction: - Diagnosis of AMI was made according to "WHO" criteria definite myocardial infarction. The World Health Organization diagnosis of myocardial infarction depends on the presence of at least two of the following[10].

- Typical chest pain for more than 20 minutes.
- ECG changes with development of Q waves, bundle branch block or ST segment elevation or depression of at least 0.1 mv for 24 hours and
- Increased cardiac enzymes (Creatinine Phosphokinase, Troponins)

Hyperacute phase:

1. ST segment elevation, tall and widened T waves.
2. Reciprocal ST segment depression.

Evolved phase: Pathological Q waves duration 0.04 sec or more and amplitude 4mm or more or >25% of respective 'R' wave.

Localization of AMI:

Anterior wall:

- Anteroseptal infarction pattern in V1 to V4.
- Anterolateral infarction pattern I, avL, V5 to V6.
- Extensive/Trans anterior wall combination of both.

Inferior wall: II, III and aVF

Posterior wall: along with inferior wall tall T waves in V_1 and V_2.

Sub-endocardial: Deep symmetrical, arrow head & inverted 'T' waves.

RV infarction: ST elevation of >1 mm in V_3R and V_4R in association with inferior wall changes. R with ST depression and tall T waves in V_1 and V_2.

Exclusion criteria: Age more than 45 years, chronic renal failure, SLE, Psoriasis, Leukemia and Hypothyroidism.

Data collection: data was collected on socio-demographic parameters. Past history and family history of CAD was explored. Physical and clinical examination was done. Risk factors evaluation was done by using a questionnaire.

Physical examination: A complete general and systemic physical examination was done in all patients and severity of AMI was classified according to Killip's classification[10].

Killip's class	Symptoms and signs	Predicted mortality
1.	No signs of pulmonary or venous congestion	85- 95%
2.	S3 gallop, RVF, Tachypnoea, rales at the lung bases	0 -5%
3.	Severe heart failure, pulmonary edema	10 - 20%
4.	Shock, cyanosis, cold extremities, confusion, oliguria	35 - 45%

*Corresponding Author: Dr. Pramod Pandurang Mulay, Director, Pulse Cardiac Care Hospital, Latur

Risk Factors Analysis: All patients were subjected to relevant history taking and clinical examination so as to define the risk factors like smoking, Physical activity, Socio-economic status, Hypertension, Obesity, diet, Family history, Oral Contraceptive use etc.

Data analysis: Data was collected and analysis was done in line with objectives. Quantitative data were presented by using mean and standard deviation. Qualitative data were presented by using proportion and percentages. Chi square was used as test of significance. P value less than 0.05 was taken as statistically significant.

Results:

Socio-demographic profile: Out of total 45 study participants 40 (88.9%) were male and 5 (11.1%) were female. Minimum age was 22 years. Mean age was 39.8 years with standard deviation of 1.8 years. Maximum numbers of patients were in the age group of 41 – 45 years (35.56%), followed by 36 – 40 years (33.33%) and 31 – 35 years (22.22%) respectively. Majority of the patients were from middle income group. Most (77.78%) of the patients were non-vegetarian. Out of 45 patients admitted and studied 6 (13.4%) had died. Age and sex wise distribution was statistically insignificant (p=0.2) (Table 1).

Table 1: Age and Sex wise distribution of study participants (n=45)

Age in years	Sex		Total	Percentage
Age group	Male	Female		
21-25	1	0	1	2.22
26-30	3	0	3	6.67
31-35	10	0	10	22.22
36-40	11	4	15	33.33
41-45	15	1	16	35.56
Total	40	5	45	100

Physical activity of the patients under study was graded as class I to class IV, class I being inactive group and class IV activity consists of manual laborers. Class I and Class II were having sedentary life styles. In present study majority of patients (55.56%) belonged to less physically active group. Maximum (35.56%) were from grade II physical activity followed by grade III (33.33%), grade I (20.00%) and grade IV (11.11%) respectively (Table 2).

Table 2: Physical activity among study participants (n=45)

Grades of Physical Activity	Number	Percentage
I	9	20.00
II	16	35.56
III	15	33.33
IV	5	11.11

Chest pain was the commonest complaint noted in 39 patients (86.67%) followed by perspiration in 22 patients (48.89%). Syncope was noted in only 1 patient and ketoacidosis on presentation was seen in 1 patient. Tachycardia was noted in 7 (15.56%) and bradycardia was noted in 3 (6.67%) patients. Out of 45 cases, 24 cases (53.33%) were normotensive while 12 patients (26.67%) were found to be hypertensive. In 8 patients (17.78%) hypotension was noted and in 1 patient (2.22%) BP was not recordable at time of admission. Cyanosis was seen in 3 cases (6.67%). Killip's classification indicates the clinical severity of AMI at the time of presentation. Maximum patients (62.22%) belong to Killip's class I followed by 10 patients in Killip's class II (22.22%). The most grievous Killip's class IV was seen in 3 patients (6.67%) and all 3 died (Table 3).

Table 3: Clinical Profile of study participants on admission (n=45)

Profile	Number	Percentage
Symptoms*		
Chest pain	39	6.66
Breathlessness	9	20.00
Perspiration	22	48.89
Palpitations	7	15.56
Syncope	1	2.22
Vomiting	9	20.00
Apprehension	6	13.33
Cold extremities	3	6.67
Cough	3	6.67
Signs*		
Tachycardia	7	15.56
Baradycardia	3	6.67
Tachypnoea	19	42.22
Hypertensive	12	26.67
Not recordable	1	2.22
Jugular venous pressure elevation	7	15.56
Cyanosis	3	6.67
Killip's class		
I	28	62.22
II	10	22.22
III	4	8.89
IV	3	6.67

**Total is >100% as patients had multiple signs and symptoms*

**Corresponding Author: Dr. Pramod Pandurang Mulay,* *Director, Pulse Cardiac Care Hospital, Latur*

Anterior wall AMI was the most common. Out of 45 patients, 24 (53.33%) had anteroseptal, 23 (51.11%) had Anterolateral. Inferior wall as a site of AMI was seen in 17 cases (37.78%) and inferior wall with posterior wall extension and right ventricular extension was seen in 3 cases respectively (6.67%) each. In 13 patients (28.89%) arrhythmias were noted the lethal ventricular fibrillation on admission was seen in 1 patient (2.22%). 3 patients had bigeminy and trigeminy pattern and in only 1 patient SVT was noted. ST elevation AMI was seen in 40 cases (88.89%) while ST depression/subendocardia1 myocardial infarction was seen only in 5 cases (11.11 %) (Table 4).

Table 4: Site of Infarction, ST segment and lipoprotein level in study participants (N=45)

Presentation	Number	Percentage
Wall of ventricle*		
Anteroseptal	24	53.33
Anterolateral	23	51.11
Inferior	17	37.78
Inferior + Posterior	3	6.67
Inferior + RV	3	6.67
ST segment		
ST depression AMI	5	11.11
ST elevation AMI	40	88.89

**not mutually exclusive*

Out of 45 patients, 25 (55.56%) were smokers, followed by obesity noted as a risk factor in 20 cases (44.44%) and alcoholism was seen in 17 patients (37.78%). Hypertension was detected in 12 patients (26.67%), diabetes was seen in 6 (13.34%) patients and family history of IHD was noted in 13 cases (28.89%).

According to National Cholesterol Education Programme (NCEP) guidelines2001, the patients were identified as the cases of dyslipidaemia, which is emerged as one of the most important modifiable coronary risk factor. Hypercholesterolemia with total cholesterol >200mg% was seen in 23 patients (51.1 1%). Increased LDL level (>130 mg %) was noted as the most common pattern of altered lipid profile which was noted in 25 patients (55.56%). Hypertriglyceridemia and lower (HDL < 35 mg%) was seen in 14 cases each (3 1.1 1%).

Type A personality noted in 16 patients (35.56%). Structural aortic disease seen in 2 cases (4.44%). Increased Lp(a) level was noted in only one and the youngest member of the present study whose age was 22 years. Hyperhomocysteinemia and Protein C deficiency was noted in 1 case each (2.22%).None of the female patients enrolled in the present study was consuming OC pills (Table 5).

Table 5: Risk factors associated with AMI (n=45)

Risk Factors	Number	Percentage
Conventional		
Smoking	25	55.56
Diabetes mellitus	6	13.34
Hypertension	12	26.67
Alcoholism	17	37.78
Family h/o of IHD	13	28.89
Obesity	20	44.44
Lipoprotein		
Hypercholesterolemia (TG > 200 mg %)	23	51.11
Hypertriglyceridemia (TG > 200 mg %)	14	31.11
HDL (< 35 mg %)	14	31.11
LDL (> 130 mg%)	25	55.56
Newer Risk Factors		
Type A personality	16	35.56
Increased Lp (a)	1	2.22
Hyperhomocysteinemia	1	2.22
Protein C deficiency	1	2.22
Structural aortic disease	2	4.44

Discussion:

In present study out of 45 patients more than 80% were male, 35% were in the age group of 41-45 years and only 6% were below 30 years age. This is in agreement with the other studies [11-14].

AMI is more common in the 4th decade of life and les common in the younger age group, there is striking increase in incidence of disease as age advances. It confirms that age is non-modifiable, most powerful and independent risk factor for AMI.

The sex distribution of coronary artery disease of young in the present study shows that the women are remarkably protected against myocardial infarction during the reproductive life by high KDL-C levels. Estrogen has direct protective effect on the arterial wall however its reason is poorly understood. This explains the wide sex difference in the incidence of AMI before menopause[15].

In the present study 46% of patients belonged to physically more active group. Remaining 55% belonged to less physically active group having sedentary life style. This is consistent with the fact that physical inactivity predisposes

***Corresponding Author: Dr. Pramod Pandurang Mulay,** Director, Pulse Cardiac Care Hospital, Latur*

to CAD. It is also true that AM1 occurs in increasing incidence in physically active young people and extreme physical exertion at the time of infarction is more common in younger patients than elderly and in those with normal coronaries suggesting coronary spasm as possible etiology[16].

In the present study the highest incidence of infarction was in social class II and III constituting 66.67%. This is comparable with the study done by Banerjea et al[5] (1970) that the major bulk of incidence i.e. 77% was in the middle income group.13% of patients' belonged to socioeconomic class I. Chest pain associated with perspiration is the most common and dominant feature of, AMI. The present study confirms this fact in which chest pain was the presenting feature in 39 patients (86.67%) and perspiration was noted in 22 (48.89%) patients.

In the present study 35 cases (77.78%) were non - vegetarian or omnivorous and10 cases (22.23%) were pure vegetarian. The diet has got complex effects. Pure vegetarian or non-vegetarian is not a risk factor. Diet had got several protective (antioxidants, fibers etc) and deleterious (excessive intake of total energy or excessive calories, more saturated fats, high sodium, simple carbohydrates etc) effects, but the strength of the evidence supporting the relationship between each of these factors and CHD is variable[17].

In the present study, 29 patients (64.44%) had anterior wall AMI in which 23 patients (5 1.1 1%) had Anterolateral and 17 patients (37.38%) had transanterior and 24patients (53.33%) had anteroseptal AMI, 3 patients (6.67%) had posterior extension and 3 patients (6.67%) had right ventricular extension. 17 patients (37.78%) had inferior wall MI. The present study is comparable to the study done by Kaulet al[56] and Gurpaal et al[12].

Smoking was one of the important risk factors for AMI in this study, present in 55.56% of patients. Smoking causes platelet aggregation and increased monocyte adhesion to endothelial cells and increases inflammatory markers such as CRP, fibrinogen and soluble intercellularadhesion[18] molecules. Tobacco smoke is more thrombogenic than atherogenic. Smoking of ≥20 cigarettes per day is associated with 2-3 fold increase in risk of CAD. Type-A personality was noted in 16 patients (35.36%). Apart from conventional risk factors two cases of structural aortic disease, one case each of increase dLp(a) level, Hyperhomocysteinemia and protein-c deficiency had been noted as risk factors as newer risk factors.

Conclusion:

In young patients with AMI majority of the patients belong of the age group between 36-45 years. The majority of patients with myocardial infarction at young age is haemodynamically stable and have anterior wall MI. ST Elevation AMI is more commonly seen than ST depression AMI. Diet has got complex effects on CAD and AMI in young age. Smoking, hyperlipidemia, hypertension, Diabetes mellitus either single or in combination appear to be the commonest conventional risk factors for AMI in young patients. Newer risk factors are commonly associated with AMI at young age.

References:

[1] Andrew G. Bostrom, et al: Elevated Lp (a) coronary heart disease in men aged 55years and younger. JAMA: 276:544-548; 1990.
[2] Anischkow N.' Chalatow S., on experimental cholesterinsteatosis and its significance in the origin of some pathological processes (1913), reprinted in Arteriosclerosis 3: 178-1 82: 1983.
[3] Aber et al: Vomiting as a diagnostic aid in acute ischemic cardiac pain, BMJ, 1980; 281: 636.
[4] Assman G. Schulte H. Von Eckardstein A et al: High density lipoproteins cholesterol as predictors of coronary heart disease risk. Atherosclerosis 124:5 1 1-520, 1996.
[5] Banerjea et al: Prognosis of myocardial infarction, 197 1; 23:3.
[6] Bansal NC et al. Precocious Myocardial infarction, IHJ, 1978; 31:200.
[7] Baunwald E. Autman M: Acute myocardial infarction, textbook of Cardiovascular Medicine 2001; 1114- 1219.
[8] Biuswas PK, et al: Risk factors and angiographic profile of CAD in young, JIMA 1995; 93-3.
[9] Boushey CJ, Beresford SAA, et al: A quantitative assessment of plasmahomocysteine as a risk factor for vascular disease: JAMA, 1995; 274: 1049-1 057.
[10] JK Gambhir et al: Lp(a) as a independent risk factor for coronary artery disease in patients below 40 years of age. Indian Heart Journal: 2000.
[11] Jick H, Dinan B, Herman R, Rorhman KJ: Myocardial infarction and other vascular diseases in young women. J. Am. Med. Assoc., 1978; 2548-2552.
[12] Gurpaal Singh, Arava I S et al : Myocardial infarction in young population, IHJ,2002; 15-4, 587- 596.
[13] Doughty M, Mehta R, Brukrnan D, Das S, Karavite DT, Sail T, Eagle K: Acute myocardial infarction in the young- Am.Heart J. 2002; 143:56-62.
[14] Ranjith N., Verho N.K., Verho M., Winkelmann B.R.: Acute myocardial infarction in young South African Indian based population patient's characteristics on admission and gender specific

*Corresponding Author: Dr. Pramod Pandurang Mulay, Director, Pulse Cardiac Care Hospital, Latur

risk factors prevalence. Curr. Med. Res. Opin.2002; 18:242-248.

[15] James TM. Post HW. Smith FJ: Myocardial infarction in young woman, Arhc.Int. Med. 1955; 43:153-164.

[16] Braunwald Heart disease, 6th edition, 2001; Chapter 31: page 1010-1039.

[17] Gupta Rajeev, Comprehensive cardiovascular risk assessment/intervention "Newer risk factors", API Medicine update, 2004, Vo1.14 page no 28-24.

[18] Libby Peter, Pathogenesis and prevention of atherosclerosis, Harrison's principles of Internal Medicine, 15"' edition, 2001; 1: 177- 1399.

Corresponding Author:
Dr. Pramod Pandurang Mulay

Director, Pulse Cardiac Care Hospital, Latur
Mobile: 09867120710