A study of risk factors for acute myocardial infarction in patients below 35 years in India

Amol Devidasrao Kothalkar[1], Ansari Basheeruddin Shamsuddin[2], Harshal Surendra Patil[3], Sandip Ashok Bharude[4]

[1]Associate Professor, Department of Cardiology, Dr Ulhas Patil Medical College & Hospital, Jalgaon, Maharashtra, India.
[2]Assistant Professor, Department of Cardiology, Dr Ulhas Patil Medical College & Hospital, Jalgaon, Maharashtra, India.
[3]Assistant Professor, Department of Cardiology, Dr Ulhas Patil Medical College & Hospital, Jalgaon, Maharashtra, India.
[4]Assistant Professor, Department of Cardiology, Dr Ulhas Patil Medical College & Hospital, Jalgaon, Maharashtra, India.

Abstract

Background: Coronary artery disease (CAD) is most common cause of mortality. Its incidence in young Indians is about 12%−16%. Myocardial infarction (MI) in young can be divided into two groups, those with angiographically normal coronaries and those with CAD. 15%−20% of those with CAD have no identifiable risk factors and therefore miss the opportunity for primary prevention. Recent reports have suggested that increased lipoprotein a (Lp[a]) and hyperhomocysteinemia play an important role in MI. The true prevalence of CAD in young is grossly underestimated. **Aim & Objective:** 1. Study Risk factors for acute myocardial infarction.2. Study clinical profile of acute MI.3. To assess the relationship of emerging risk factors such as homocysteine and Lp(a) with M **Methods: Study design:** A Cross Sectional Study. **Study setting:** Cardiology department of tertiary care centre. **Study population:** The study population included all the cases with acute myocardial infarction patients admitted at a tertiary care center **Sample size:** 50 **Results:** The majority of patients were males (80%). The mean age was 33.3 in males and 31.8 years in females. Chest pain was the most common presenting complaint (94%). Smoking was the most prevalent risk factor (72%). Hyperhomocysteinemia (42%) and raised Lp(a) (24%) were emerging risk factors. **Conclusions:** Homocysteine and Lp(a) should be measured in young MI patients. Smoking cessation and prevention of diabetes and hypertension should be encouraged. As young patients have more discrete lesion, timely revascularization will reduce myocardial damage

Keywords: Coronary artery disease, hyperhomocysteinemia, lipoprotein a, myocardial infarction

Corresponding Author: Dr. Sandip Ashok Bharude, Assistant Professor, Department of Cardiology, Dr Ulhas Patil Medical College & Hospital, Jalgaon, Maharashtra, India.
Email: hypomaniac07@gmail.com

Introduction

Coronary artery disease (CAD) is the most common cause of mortality in the entire world.[1] CAD in the absence of atherosclerosis, uncommon in older patients accounts for approximately 20% of cases in patients under age 45.[4-6] The prevalence of CAD in young Indians (below 45 years) is about 12%−16%.[2,3] About 50% of CAD-related deaths in the

young below 50 years and about 25% of myocardial infarction (MI) in India occurs under the age of 40 years.[7,8]

MI in the young can be divided into two groups, those with angiographically normal coronary arteries and thosewith CAD. The prevalence of MI with normal coronary arteries varies between 1% and 12%.[9] Young MI patients have a higher percentage of normal coronary arteries. MI in them can be caused by arteritis, thrombosis, embolization, or spasm. As is the case with venous thrombosis, coronary thrombosis can be seen in hypercoagulable states, such as protein C and protein S deficiency, antiphospholipid syndrome, or nephrotic syndrome.[10,11]

Coronary artery spasm can cause MI in patients with cocaine abuse and also in association with alcohol binges.[12,13] Other unusual causes include hypertension, coronary aneurysms, mediastinal irradiations, valvular abnormalities, and infective endocarditis. Although traditional risk factors such as hypertension, insulin resistance, diabetes mellitus, smoking, hyperlipidemia, physical inactivity and obesity explain most of CAD, 15%–20% of those with CAD have no identifiable risk factors and therefore miss the opportunity for primary prevention.[14]

Recent studies show that increased Lp(a), hyperhomocysteinemia plays an important role in MI.[15] Some 10%–20% of cases of CAD have been linked to elevated level of serum homocysteine. Lp(a) is considered to be 10 times more atherogenic than low-density lipoprotein-cholesterol (LDL-C) and is associated with a family history of MI in asymptomatic individuals, as well as with clinical MI, CAD, and restenosis of coronary artery vein grafts.[16-19] Factor V Leiden mutation also has been shown to increase the risk for MI. It may be possible that there is increased prevalence of hyperhomocysteinemia and elevated Lp(a) levels in Indian subcontinent leading to an early age of onset of first MI in Indians. Recently in studies, it has been found that measuring apolipoprotein (Apo)-B and Apo-A1 is better than measuring LDL-C and high-density lipoprotein-cholesterol (HDL-C) as the type of HDL-C and LDL-C (size and density) is more important rather than the absolute values. Small dense LDL-C particles are more atherogenic.[20]

Approximately, 50% of patients have single vessel disease (SVD) while the remainder has multivessel disease. The prevalence of left main coronary artery stenosis is approximately 5%.[21] The true prevalence of CAD in the young is grossly underestimated. Therefore, this study was done to find out the association of recently identified risk factors along with traditional risk factors with the premature onset of CAD in young patients who are 35-year-old or younger.

Aim And Objective
Objective
1. Study Risk factors for acute myocardial infarction.
2. Study clinical profile of acute MI.
3. To assess the relationship of emerging risk factors such as homocysteine and Lp(a) with M

Material And Methods
Study design: A Cross Sectional study
Study setting: Cardiology department of tertiary care centre
Study population: The study population included all the cases with acute myocardial infarction patients admitted at a tertiary care center
Inclusion criteria:
1. All patients aged 35 years or younger admitted with MI.
Exclusion criteria:
   1. Not willing to participate in the study.

2. Patients below 18 years and above 35 years were not included.

Approval for the study

Written approval from Institutional Ethics committee was obtained beforehand. Written approval of Cardiology department was obtained. After obtaining informed verbal consent from all patients with acute myocardial infarction admitted to Cardiology ward of tertiary care centre such cases were included in the study.

Sample Size: 50

Sampling technique:

Convenient sampling technique used for data collection. All acute myocardial infarction patients admitted in the Cardiology department of tertiary care center were included in the study.

Methods of Data Collection and Questionnaire

Predesigned and pretested questionnaire was used to record the necessary information. Questionnaires included general information, such as age, sex, religion, occupation of parents, residential address, and date of admission. Medical history- chief complain, past history, general examination, systemic examination

Data on demographic profile of acute myocardial infarction patients, investigation, personal history, medical past history, treatment modalities, and clinical outcome data collected from patients admitted in medicine ward.

All the procedures and investigations conducted under direct guidance and supervision of pg guide. Proforma of acute myocardial infarction notes maintained.

Screening procedure:

History of patients including presenting complaints, medical illness, drug history, personal history, past medical history

- Clinical Examination- General and systemic examination
- Patients fasting blood sample were send for checking lipid profile
- Patients blood sample were send for checking random lipid profile

Data entry and analysis

The data were entered in Microsoft Excel and data analysis was done by using SPSS demo version no 21 for windows. The analysis was performed by using percentages in frequency tables and correlation of stroke. $p < 0.05$ was considered as level of significance using the Chi-square test

Result and Observation

Table 1: distribution of cases as per sex

Sex	Percentage
Male	80%
Female	20%
Total	**100**

Majority cases were male 80% and female 20%.

Table 2: Distribution of cases as per clinical features

Sr No	Clinical features of MI	Frequency	Percentage
1	Chest pain	46	92%
2	Radiating pain	27	54%
3	sweating	32	64%
4	Breathlessness	42	84%

Majority of cases complained chest pain 46 (92%) followed by breathlessness 42 (84%), sweating 32 (64%) and radiating pain 27 (54%).

Table 3: Proportion of various Modifiable Risk factors of MI (n=50)

Risk factors of stroke	Frequency	Percentage
Hypertension	39	78%
Diabetes	29	58%
Dyslipidemia	32	64%
Tobacco	17	34%
Obesity	38	76%
Low physical activity	35	70%

Majority of cases presented with HTN 39 cases (78%) followed by obesity 38 (76%), low physical activity 35 (70%),dyslipidemia 32 (64%), DM 29 (58%) and tobacco 17 (34%).

The serum TG levels were elevated in 76% of the patients [Figure 1]. LDL‑C levels were high in 20% of the patients while 16% of the patients had very high levels of LDL‑C [Figure 2]. The homocysteine level was above normal (>15 μmol/L) in 42% of patients, of which 16% patients had homocysteine level between 15 and 30 μmol/L (moderate risk), 24% had levels between 30 and 100 μmol/L (intermediate risk), and 2% patients had levels above 100 μmol/L (high risk) [figure 3]
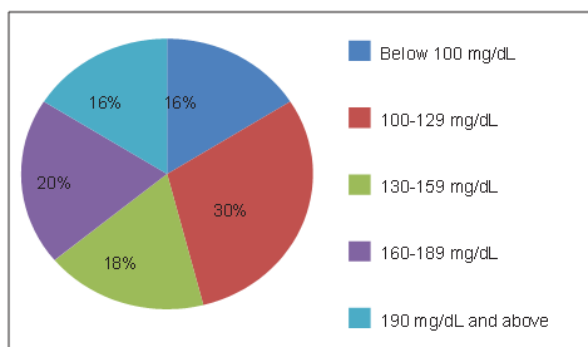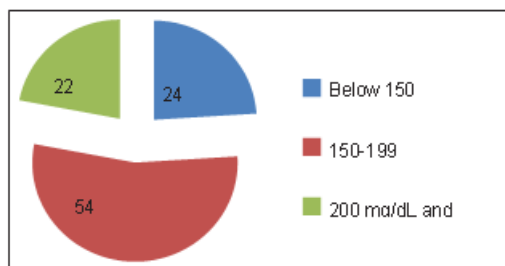

Figure 1: triglyceride level

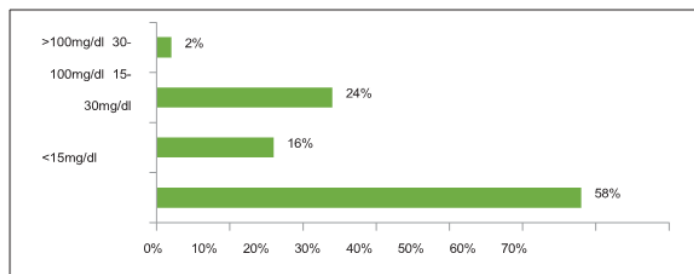**Figure 2: Low-density lipoprotein-cholesterol levels**

Figure 3: Homocysteine levels

Discussion

AMI is rare before 35 years of age, but there is a rising trend in young population nowadays. Most of the patients belonged to higher range of age group that is 31–35 years which contributed 66% of the patients and only 2% of the patients were below 25 years of age. The mean age was 33.3 years for females and 31.82 years for males. The distribution of age group showed a striking increase in the disease with increasing age.

This in accordance to previous studies which also showed increasing trend with increasing age even in young patients. In a study done by Sricharan *et al*. also the maximum number of the patients (70%) were within in the age of 35–40 years and 3.33% patients being in the age group of 25–30 years.[22] In addition, in a study by Prajapati *et al*. the mean age was 34.5 ± 4.7 years.[23]

Male sex is an important risk factor for IHD. In our study 80% of the patients were male. A study by Prajapati *et al*., also 89.9% patients were male.[23] Thus, the demographic profile of our patients was similar to previous studies.

Tobacco smoking is an established conventional coronary risk factor for CAD. Casual association between tobacco chewing (smokeless tobacco) and CAD is found in some case control studies. Tobacco increases the risk of cardiovascular (CV) disease by raising blood pressure, damaging vascular endothelium, increasing LDL‑ cholesterol oxidation, and lowers the HDL‑ cholesterol. Smoking was found to be a most prevalent risk factor (72%) in our study also.

This was in line with a previously reported prevalence of 77% in Swiss patients aged ≤35 years by Schoenenberger *et al*.[24] Studies done in India also showed smoking the most prevalent risk factor.[22,23,25] Thus, an effort should be made to educate people about the hazards of cigarette smoking, and people should be educated at an early age to avoid smoking, and smoking cessation programs need to be established About 24% of the patients were diabetic, of which 10% were newly detected and hypertension was present in 18% of the patients. BMI more than 25 kg/m2 was seen in 32% of the patients.

A study by Sricharan *et al*.[22] and Jamil *et al*.[25] also showed a similar trend In previous studies also hyperlipidemia was found to be a common risk factor. In a study by Sricharan *et al*. hyperlipidemia was the second most common risk factor (36.67%).[22] Hyperlipidemia was documented in 46% of the study population in the study by Hassan *et al*.[21] Similar results were obtained in the study by Prajapati *et al*.[23]

In our study, Lp(a) levels were above 30 mg/dl in 24% of the patients representing an important risk factor in young patients with MI. In the study by Prajapati *et al*. 26 (21.5%), patients had a high level of Lp(a) similar to our study.[23] Similarly, in the studies by Schaefer *et al*. (elevated in 21.5% of patients) the Lp(a) level was significantly higher in young patients with MI as compared with controls.[26]

Homocysteine levels are higher among Asian Indians than others. In India, most people adhere to a vegetarian diet and vegetarians have 3.0 times higher risk of hyperhomocysteinemia compared to those who eat nonvegetarian. In our study, homocysteine levels were above normal in 42% of the patients. Furthermore, in the study done by Arumalla and Reddy[27] hyperhomocysteinemia was found in 66% of the patients with AMI.

The slightly lower prevalence of hyperhomocysteinemia in our patients might be due to increased fish consumption and fruits. Hence, we should encourage higher intake of fruits and avoid overcooking of vegetables to prevent hyperhomocysteinemia.

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