



CLINICAL PROFILE AND RISK FACTORS OF MYOCARDIAL INFARCTION IN YOUNG INDIVIDUALS

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ABSTRACT

Introduction: Myocardial infarction (MI) in young adults (age 15-45) is increasingly prevalent despite being traditionally associated with older populations. This study aimed to identify clinical profiles and risk factors of MI in young individuals, including traditional as well as potential novel risk factors. **Methodology:** A cross-sectional observational study was conducted at Government Medical College, Kozhikode from July 2023 to January 2025. 130 patients aged 15-45 years with first acute coronary syndrome were enrolled. Demographic data, clinical history, and biochemical parameters were analyzed using standardized questionnaires and laboratory investigations. **Results:** The mean age was 40 years with male predominance (77%). Family history of coronary artery disease (53%), smoking (52%), physical inactivity (50%), and diabetes mellitus (40%) emerged as leading risk factors. Dyslipidemia patterns included low HDL (38%), elevated triglycerides (55%), and high total cholesterol (33%). Notably, 18% had previous thrombotic events, 17% exhibited polycythemia, and 13% reported substance abuse. 24% had no identified traditional risk factors. Among tested participants, 72% showed elevated homocysteine levels, while 69% of tested patients had elevated lipoprotein (a). 6% had other systemic illness like CKD, SLE, and RA, which predisposed them to premature MI. **Conclusion:** MI in young adults exhibits a multifactorial risk profile combining traditional cardiovascular risk factors with unique elements like substance abuse and thrombophilia. The high prevalence of metabolic disorders, smoking, and family history underscores the need for targeted screening and preventive strategies in this age group. Early identification of modifiable risk factors could significantly reduce the burden of premature coronary disease.

KEYWORDS : Young Myocardial Infarction, Cardiovascular Risk Factors, Premature Coronary Artery Disease, Dyslipidemia, Thrombophilia

INTRODUCTION

Myocardial infarction (MI) is traditionally considered a disease of middle-aged and elderly populations, yet its incidence among younger adults is rising steadily. Young myocardial infarction (defined in this study as 15–45 years) has unique clinical and epidemiological implications, as it affects individuals in their most productive years and contributes to long-term morbidity, mortality, and socioeconomic burden(1)

Several conventional risk factors—such as smoking, diabetes, dyslipidemia, hypertension, and family history—are known contributors to MI in this group. However, non-traditional risk factors including thrombophilia, substance abuse, polycythemia, and novel biomarkers like homocysteine and lipoprotein(a) are increasingly being implicated. Identifying the relative contributions of these risk factors in young patients is crucial for targeted prevention and early intervention(2)

This study was conducted to determine the clinical profile, metabolic characteristics, and risk factor distribution among young patients presenting with a first episode of acute coronary syndrome (ACS) at a tertiary care center in Kerala, India.

Methodology

This was a cross-sectional observational study conducted at Government Medical College, Kozhikode between July 2023 and January 2025. A total of 130 consecutive patients aged 15–45 years who presented with a first episode of ACS were included. Inclusion criteria were dynamic electrocardiographic changes or elevation of cardiac biomarkers consistent with MI(3). Patients with prior coronary artery disease, sepsis, myocarditis, or congenital heart disease were excluded.

Data were collected using a structured proforma that captured sociodemographic details, medical history, lifestyle factors, family history, and medication use. Clinical examination and ECG findings were documented. Laboratory investigations

included fasting blood sugar, HbA1c, lipid profile, uric acid, hemoglobin, and additional parameters such as homocysteine and lipoprotein(a) where indicated.

Statistical analysis was performed using SPSS software. Continuous variables were expressed as mean $\pm$ standard deviation, and categorical variables as percentages. Associations between risk factors were assessed using chi-square tests, with odds ratios and 95% confidence intervals calculated.

RESULTS

Demographics

The mean age of participants was 40 years (range 20–45), with the largest proportion in the >40 years group (47%). Males predominated, accounting for 77% of the sample (Figure 1)

Fig 1: Demographics of Study Participants

Comorbidities

Diabetes mellitus was Present in 40% of patients, while hypertension was reported in 17%. Dyslipidemia was identified in 27% of patients, many of whom were already on statin therapy

Thrombotic and Hematologic Risk

Eighteen percent of participants had a history of thrombotic events such as deep vein thrombosis, stroke, or transient ischemic attacks. Polycythemia was detected in 17% based on hemoglobin criteria. Elevated uric acid was seen in 17% of patients.

Lifestyle Factors

Smoking was reported by 52% of participants, with a mean exposure of 7.2 pack-years. Substance abuse involving cocaine, marijuana, or cannabinoids was noted in 13%. Among female patients, 20% had a history of oral contraceptive pill use. Physical inactivity was highly prevalent, with 50% reporting no regular activity.

Family History and Genetic Markers

A family history of premature coronary artery disease was reported in 53% of patients. Among those tested, 72% had elevated homocysteine levels ($>15 \mu\text{mol/L}$), and 69% had elevated lipoprotein(a) levels ($>30 \text{ mg/dL}$).

Anthropometric and Metabolic Findings

The mean BMI was 22.8 kg/m^2 , with 25% classified as obese by Asian criteria ($>23 \text{ kg/m}^2$). Waist circumference was elevated in 33% of participants.

- **Fasting Glucose:** Elevated ($>126 \text{ mg/dL}$) in 48 patients (37%).
- **HbA1c:** Elevated ($>6.5\%$) in 30%.
- **Lipid Profile**
 LDL: Optimal in 35%, high ($>160 \text{ mg/dL}$) in 19%, very high ($>190 \text{ mg/dL}$) in 9%. (Table 6.1)
 HDL: Low in 38% of participants.
 Triglycerides: Elevated in 55%.
 Total cholesterol: Elevated ($>240 \text{ mg/dL}$) in 33%.
 Ratios: TC/HDL was ≥ 4.5 in 55% and TG/HDL was >3.0 in 70%.

Table 1 Distribution of LDL

Distribution of LDL	Frequency	Percentage
Optimal <100	46	35%
Above Optimal-100-129	37	28%
Borderline High- 130-159	23	18%
High- 160-189	13	10%
Very High- >190	11	9%

Clinical Presentation

NSTEMI was the most common presentation (47%), followed by STEMI (36%) and unstable angina (17%).

Risk Factor Clustering

The most frequent risk factors were family history (53%), smoking (52%), physical inactivity (50%), and diabetes mellitus (40%). Twenty-four percent of patients had no identifiable conventional risk factor (Table 2)

Table 2 : Risk Factor for Young MI

Risk factor	Frequency	Percentage
Family history of CAD	69	53%
Smoking	68	52%
Physical inactivity	65	50%
DM	52	40%
Dyslipidemia	35	27%
No known risk factor	31	24%
Hypertension	22	17%
Substance abuse	20	13%
Obesity	31	24%

DISCUSSION

This study highlights the multifactorial nature of myocardial infarction in young individuals, with both traditional and non-traditional risk factors contributing significantly.

Age and Gender: The mean age of 40 years and male predominance (77%) align with global data. Male vulnerability may relate to loss of estrogen's protective effects, higher prevalence of smoking, and occupational stressors(4)

Diabetes and Hypertension: Diabetes mellitus affected 40% of patients, markedly higher than regional studies reporting 8–20%. This may reflect earlier onset of metabolic syndrome in the local population(5,6) Hypertension prevalence was lower (17%) than in some studies, suggesting that diabetes and dyslipidemia may be stronger drivers of risk in this cohort (5)

Dyslipidemia: Over one-third of patients had abnormal lipid profiles, with elevated triglycerides and reduced HDL being particularly common. Familial hypercholesterolemia was identified in 9%, underscoring the role of genetic dyslipidemias in young MI (7,8)

Lifestyle Factors: Smoking was reported by more than half of the participants, comparable to other South Asian cohorts(5) Substance abuse was noted in 13%, consistent with emerging evidence linking cannabis and cocaine to MI in young adults. Physical inactivity and obesity were also important contributors.

Genetic and Novel Risk Markers: Family history of CAD was present in 53%, highlighting genetic predisposition. Among those tested, homocysteine and lipoprotein(a) were frequently elevated, suggesting the need for broader incorporation of these biomarkers in risk assessment of young MI patients(9)

Other Findings: In our study of 130 patients, 22 (16.9%) had uric acid levels above 6.5 mg/dL . Elevated uric acid, a key metabolic syndrome marker, may indicate cardiovascular risk. J. Bos et al. similarly found high uric acid levels linked to increased risk of myocardial infarction and stroke, suggesting it may be an independent risk factor in young adults.(10) Polycythemia were notable in subsets of patients, conditions often overlooked in cardiovascular risk evaluation. The clustering of multiple metabolic and lifestyle factors in most patients underscores the need for multifaceted preventive strategies.

Clinical Implications

- Early screening of high-risk young adults, especially with family history or metabolic abnormalities.
- Aggressive management of modifiable factors including smoking cessation, weight control, and diabetes/lipid optimization.
- Consideration of thrombophilia and novel biomarkers in patients without conventional risk factors.
- Toxin screening in adults with young MI if no other known risk factors.
- Scope for further targeted studies around COVID 19 infections and thrombotic risks.

CONCLUSION

Myocardial infarction in young adults is driven by a complex interplay of metabolic, genetic, and lifestyle risk factors. Diabetes, dyslipidemia, smoking, and family history remain predominant, while novel risk factors such as homocysteine, lipoprotein(a), polycythemia, and substance abuse are increasingly recognized. Given that nearly one-quarter of patients presented without conventional risk factors, a broader approach to risk stratification is warranted.

Targeted screening, early lifestyle interventions, and aggressive control of metabolic parameters could substantially reduce the burden of premature coronary artery disease in this vulnerable population.

Limitations

The cross-sectional design of this study limits the ability to establish causal relationships, permitting only assessment of risk factor prevalence. The absence of a comprehensive control group, combined with a sample of 130 patients from a single government medical college, may reduce generalizability due to potential geographical and institutional biases. Diagnostic limitations, including incomplete screening of serum homocysteine, lipoprotein(a), thrombophilia, and genetic factors, could underestimate their true prevalence. Additionally, reliance on patient-reported histories may introduce recall bias, and the restricted age range (15–49 years) limits applicability to other populations. These factors warrant cautious interpretation of the findings.

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