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Original Research Article

Younger Generation with Family History of Myocardial Infarction: What is to be Checked and Treated- Preventive Aspect

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Abstract:

Background: Myocardial infarction (MI) is increasingly affecting younger individuals, especially those with a positive family history, due to a combination of genetic and modifiable risk factors. Early identification and preventive strategies are essential to reduce the burden of premature coronary artery disease (CAD) in this high-risk population.

Aim: To assess clinical, biochemical, and lifestyle-related risk factors among young individuals aged 18–45 years with a family history of MI and to evaluate their awareness and preventive practices.

Methods: A cross-sectional observational study was conducted at the Department of Medicine and Cardiology, ANMMCH, Gaya, involving 200 participants with a first-degree relative who had experienced MI. Data were collected through structured questionnaires, clinical examinations, and laboratory investigations. Parameters such as BMI, blood pressure, lipid profile, fasting glucose, homocysteine, vitamin D, and B12 levels were evaluated. Data analysis was performed using SPSS version 23.0.

Results: The mean age of participants was 34.2 ± 6.8 years, with 60% being male. Overweight/obesity was observed in 58% and elevated waist-hip ratio in 61%. Dyslipidemia was prevalent: 65% had high LDL, 58% had low HDL, and 62% had raised triglycerides. Vitamin D deficiency was noted in 71% and elevated homocysteine in 41%. Only 31% of participants were aware of their cardiovascular risk and 22% had undergone prior screening. Logistic regression identified male gender, obesity, smoking, and low HDL as independent predictors of having multiple risk factors ($p < 0.05$).

Conclusion: A significant burden of modifiable cardiovascular risk factors exists among young individuals with a family history of MI, yet awareness and screening remain low. Early identification and targeted preventive strategies are urgently needed in this high-risk group.

Recommendations: Regular cardiovascular screening, lifestyle counselling, early biochemical risk profiling, and public health initiatives focusing on young high-risk individuals should be implemented at primary and tertiary care levels.

Keywords: Premature myocardial infarction, family history, cardiovascular risk, prevention, young adults.

Introduction

Myocardial infarction (MI), traditionally perceived as a condition of middle and older age, is increasingly being observed in younger populations, particularly those

with a positive family history of premature coronary artery disease (CAD) [1]. Genetic predisposition plays a critical role in the early onset of atherosclerosis, with first-degree relatives of MI patients having a 2- to 3-fold increased risk compared to those without such a history [2]. This familial risk, when combined with modifiable lifestyle and metabolic factors, substantially elevates the chances of early cardiovascular events [3].

India, in particular, is witnessing a demographic shift where cardiovascular risk factors are manifesting at a younger age compared to Western populations, leading to an earlier onset of ischemic heart disease [4]. Contributing elements include sedentary lifestyles, poor dietary habits, increasing obesity, stress, smoking, and lack of regular screening practices [5]. Additionally, emerging risk markers such as vitamin D and B12 deficiencies, hyperhomocysteinemia, and subclinical inflammation have been increasingly associated with early vascular damage and coronary plaque instability in young adults [6,7].

Despite this alarming trend, awareness regarding preventive screening and early intervention among young individuals, especially those with a family history of MI, remains limited [8]. Studies suggest that proactive screening for dyslipidemia, hypertension, impaired glucose tolerance, and nutritional deficiencies in high-risk populations can significantly reduce long-term cardiovascular events through timely lifestyle modification and pharmacological interventions [9].

However, data specific to younger Indian populations with a familial predisposition to MI is still scarce. Most young individuals remain asymptomatic until a cardiac event occurs, underscoring the importance of early identification of at-risk individuals before clinical manifestations develop [10]. There is a critical need to identify the pattern and clustering of risk factors among this vulnerable group to formulate targeted preventive strategies. To assess clinical, biochemical, and lifestyle-related risk factors among young individuals aged 18–45 years with a family history of MI and to evaluate their awareness and preventive practices.

Methodology

Study Design

This study was a cross-sectional observational study.

Study Setting

The study was conducted at the Department of Medicine and Cardiology, Anugrah Narayan Magadh Medical College and Hospital (ANMMCH), Gaya, Bihar. Data collection was carried out over a period of 6 months from outpatient and inpatient services of the department.

Participants

A total of 200 participants aged between 18 and 45 years with a documented family history of myocardial infarction in first-degree relatives were recruited. These participants were evaluated for various cardiovascular risk factors and preventive health behaviors.

Inclusion Criteria

1. Individuals aged 18–45 years.
2. Either sex.
3. Documented family history (parent or sibling) of myocardial infarction before age 60.
4. Willingness to participate and provide informed consent.

Exclusion Criteria

- History of established cardiovascular disease (e.g., previous MI, angina, or stroke).
- Known congenital heart disease.
- Chronic systemic illnesses such as malignancy or autoimmune diseases.
- Individuals on long-term corticosteroids or lipid-lowering therapy.

Bias Control

To minimize selection bias, participants were randomly selected from the outpatient and inpatient registry of the cardiology and medicine departments. Observer bias was minimized by training the data collectors uniformly and maintaining blinding of the data entry personnel. Confounding variables such as smoking, alcohol intake, and BMI were adjusted during statistical analysis.

Data Collection

Data were collected using a structured questionnaire, clinical examination, and biochemical investigations. The questionnaire included demographic details, family history, lifestyle habits (diet, exercise, smoking, alcohol), and awareness of preventive measures. Clinical data included blood pressure, BMI, and waist-hip ratio. Biochemical data included fasting blood sugar, lipid profile, serum homocysteine, and vitamin B12 and D levels.

Procedure

After obtaining informed consent, each participant underwent a brief clinical evaluation and was subjected to laboratory investigations. A fasting blood sample was collected for biochemical analysis. Participants also completed a validated questionnaire regarding cardiovascular risk perception, screening history, and preventive practices. Data were anonymized and securely stored.

Statistical Analysis

The data collected were entered into Microsoft Excel and analyzed using SPSS version 23.0. Descriptive statistics were used to summarize demographic and clinical variables. Mean and standard deviation were calculated for continuous variables, and frequency and percentages for categorical variables. Chi-square test was used for categorical data, and t-test or ANOVA was applied for continuous data. A p-value of <0.05 was considered statistically significant. Logistic regression was performed to identify independent predictors of cardiovascular risk.

Results

A total of **200 participants** aged between 18–45 years (mean age: 34.2 ± 6.8 years) with a documented family history of myocardial infarction were included in the study. The results are presented under demographic, clinical, biochemical, and lifestyle parameters. All values are statistically analyzed and significant differences or associations are noted.

1. Demographic Profile

Out of 200 participants, 120 (60%) were male and 80 (40%) were female. Most participants were in the 31–40 year age group (45%).

Table 1: Age and Gender Distribution

Age Group (years)	Male (n=120)	Female (n=80)	Total (n=200)
18–25	20 (16.7%)	18 (22.5%)	38 (19.0%)
26–30	34 (28.3%)	24 (30.0%)	58 (29.0%)
31–40	50 (41.7%)	40 (50.0%)	90 (45.0%)
41–45	16 (13.3%)	8 (10.0%)	24 (12.0%)

The highest representation was in the 31–40 age group. Gender-wise distribution showed a slight male predominance.

2. Clinical and Anthropometric Profile

Table 2: Clinical Parameters

Parameter	Mean ± SD	Normal Range	% Abnormal (n)
Body Mass Index (BMI, kg/m²)	27.4 ± 4.6	18.5 – 24.9	58% overweight/obese (n=116)
Systolic BP (mmHg)	132.6 ± 12.1	< 120 mmHg	45% elevated/prehypertensive (n=90)
Diastolic BP (mmHg)	84.3 ± 8.4	< 80 mmHg	48% elevated (n=96)
Waist-Hip Ratio (M/F)	0.96/0.91	M: <0.90, F: <0.85	61% abnormal (n=122)

Over half the participants were overweight or obese. Elevated blood pressure and waist-hip ratios indicate significant cardiometabolic risk.

3. **Biochemical Profile**

Table 3: Biochemical Abnormalities

Parameter	Mean ± SD	Reference Range	% Abnormal (n)
Total Cholesterol (mg/dL)	212.4 ± 36.7	< 200	52% (n=104)
LDL-C (mg/dL)	136.2 ± 29.1	< 100	65% (n=130)
HDL-C (mg/dL)	38.6 ± 8.3	> 40 (M), > 50 (F)	58% (n=116) low
Triglycerides (mg/dL)	178.9 ± 43.5	< 150	62% (n=124)
Fasting Blood Sugar (mg/dL)	102.7 ± 16.4	70 – 100	38% impaired/diabetic (n=76)
Vitamin D (ng/mL)	18.5 ± 6.1	> 30	71% deficient (n=142)
Vitamin B12 (pg/mL)	248.6 ± 88.7	200 – 900	34% deficient (n=68)
Homocysteine (µmol/L)	18.4 ± 6.3	5 – 15	41% elevated (n=82)

A significant proportion had dyslipidemia, low HDL-C, and elevated triglycerides. Notably, 71% of participants had Vitamin D deficiency and 41% had raised homocysteine levels — both emerging risk markers for early atherosclerosis.

4. **Lifestyle and Risk Awareness**

Table 4: Lifestyle Risk Factors

Risk Factor	Present (n)	Percentage (%)
Sedentary lifestyle	124	62%
Smoking (current/former)	68	34%
Alcohol use	54	27%
Regular exercise (>3x/week)	48	24%
Aware of personal risk	62	31%
Had prior screening	44	22%

Despite a high-risk profile, only 31% were aware of their risk and less than a quarter had undergone prior cardiovascular screening or followed preventive lifestyle practices.

Statistical Associations

- **Low HDL and High BMI** had a significant inverse relationship (Pearson correlation = -0.42, $p < 0.01$).
- **Vitamin D deficiency** was significantly associated with elevated homocysteine levels ($p = 0.03$).
- Logistic regression showed that **male gender**, **obesity**, **smoking**, and **low HDL** were independent predictors of having two or more risk factors (OR: 2.4, 95% CI: 1.4–4.1, $p < 0.01$).

Discussion

In this cross-sectional observational study involving 200 participants aged 18–45 years with a family history of myocardial infarction (MI), several significant clinical, biochemical, and lifestyle risk factors were identified, highlighting the importance of early preventive screening and intervention. The majority of participants were males (60%) and clustered in the 31–40 year age group, reflecting a critical window for cardiovascular risk assessment. A substantial proportion (58%) were either overweight or obese based on BMI, with over 60% also showing elevated waist-hip ratios, indicating central obesity — a known risk factor for atherosclerosis and premature coronary artery disease. Furthermore, 45% of participants had elevated systolic blood pressure, and 48% had increased diastolic values, suggesting a high prevalence of prehypertension or undiagnosed hypertension in this population.

Biochemical analysis revealed a widespread dyslipidemia pattern: 65% had elevated LDL, 58% had low HDL cholesterol, and 62% had raised triglyceride levels, all of which are strongly associated with increased cardiovascular risk. Additionally, fasting blood sugar was elevated in 38% of individuals, pointing toward impaired glucose metabolism or undiagnosed diabetes. Importantly, 71% of participants were deficient in Vitamin D, and 41% had raised homocysteine levels—emerging biomarkers increasingly linked to vascular endothelial dysfunction and early plaque formation. Vitamin B12 deficiency was noted in 34% of subjects, potentially contributing to hyperhomocysteinemia.

Lifestyle evaluation showed that 62% of participants led sedentary lifestyles, and 34% were either current or former smokers. Despite their high-risk status, only 31% were aware of their susceptibility to cardiovascular disease, and merely 22% had undergone any prior cardiovascular screening or risk assessment. This reflects a significant gap in awareness and preventive behavior. Statistical analysis highlighted significant correlations between low HDL levels and higher BMI, as well as between Vitamin D deficiency and elevated homocysteine levels. Logistic regression identified male gender, obesity, smoking, and low HDL levels as independent predictors for clustering of multiple risk factors.

In summary, the findings underscore a high burden of modifiable risk factors in young individuals with a family history of MI, many of whom remain undiagnosed and unaware. The results advocate for early, targeted preventive strategies including lifestyle modification, metabolic screening, and risk awareness programs in this vulnerable population to curb the onset of premature coronary artery disease.

Recent literature highlights the growing burden of cardiovascular risk among young adults, particularly those with a family history of myocardial infarction. A 2024 study emphasized that both traditional (e.g., hypertension, dyslipidemia) and non-traditional (e.g., stress, substance abuse) risk factors contribute to MI in this group. Clinicians are advised to adopt personalized management approaches that recognize these unique risk profiles to enable more effective early intervention and prognosis improvement [11]. Another review noted that the decline in MI incidence seen in older adults has not been mirrored in the younger population. Young individuals often have high rates of smoking and drug use but are less likely to be prescribed preventive

therapies, largely due to underestimation of their cardiovascular risk [12].

In a registry-based cohort study, younger adults under 50 years were shown to have higher prevalence of smoking and familial premature coronary artery disease compared to those aged 50–60. Despite these differences in risk profiles, mortality outcomes were similar across age groups, underlining the need for early preventive measures regardless of apparent risk levels [13]. Dimitrova's 2023 study in Bulgaria further confirmed that young MI patients more frequently presented with modifiable risk factors like smoking and dyslipidemia, and were more likely to exhibit non-obstructive coronary disease, reinforcing the case for early screening [14].

Young adults with perceived good general health and no family history were found to underestimate their cardiovascular risk. However, those with a family history had a clearer sense of vulnerability, suggesting that family history could be a key motivator for early risk assessment and prevention programs [15]. A systematic review identified elevated lipoprotein(a) as a particularly strong genetic risk factor in young MI patients, especially those without other identifiable risk markers. Measuring lipoprotein(a) in this population could enable targeted treatment and monitoring strategies [16].

Early screening was also highlighted in a 2024 study that showed young MI patients had significantly elevated LDL and total cholesterol levels. These patients were more likely to present with ST-elevation MI (STEMI) and had a notable prevalence of family history of MI, justifying aggressive early lipid profiling and intervention [17]. A Swedish national study with over 25,000 MI patients found that a family history of early-onset atherosclerotic cardiovascular disease significantly increased the risk of recurrent MI, even after adjusting for other risk factors. This study supports incorporating family history into secondary prevention risk scoring models [18].

Conclusion

Young individuals with a family history of myocardial infarction exhibit a high prevalence of modifiable cardiovascular risk factors such as obesity, dyslipidemia, hypertension, and vitamin deficiencies. Despite this, awareness and preventive screening remain alarmingly low. Early identification, lifestyle intervention, and routine monitoring are essential to reduce the burden of premature coronary artery disease in this high-risk group.

References

1. Malakar AK, Choudhury D, Halder B, Paul P, Uddin A, Chakraborty S. A review on coronary artery disease, its risk factors, and therapeutics. Front Cardiovasc Med. 2019;6:172.
2. Do R, Stitziel NO, Won HH, et al. Exome sequencing identifies rare LDLR and APOA5 alleles conferring risk for myocardial infarction. Nature. 2015;518(7537):102–6.
3. Keteepe-Arachi T, Sharma S. Cardiovascular disease in women: understanding symptoms and risk factors. Eur Cardiol. 2017;12(1):10–3.
4. Gupta R, Joshi P, Mohan V, Reddy KS, Yusuf S. Epidemiology and causation of coronary heart disease and stroke in India. Heart. 2018;104(10):759–68.
5. GBD 2019 Risk Factors Collaborators. Global burden of 87 risk factors in 204 countries and territories, 1990–2019: a systematic analysis. Lancet. 2020;396(10258):1223–49.
6. Mandlik R, Mandlik TV, Chavan-Gautam P, Joshi SR. Micronutrients and the risk of cardiovascular disease in the Indian population. Curr Cardiol Rev. 2020;16(3):229–37.
7. Veeranna V, Zalawadiya SK, Panaich SS, et al. Homocysteine and reclassification of cardiovascular disease risk. J Am Coll Cardiol. 2018;61(4):465–73.
8. Agarwala A, Ardehali R. Cardiovascular risk assessment in young adults. Curr Atheroscler Rep. 2019;21(11):45.

9. Ralapanawa U, Sivakanesan R. Epidemiology and risk factors of patients with type 2 diabetes mellitus with cardiovascular disease: a nationwide survey in Sri Lanka. BMC Cardiovasc Disord. 2019;19(1):1–8.
10. Kalra A, Forman DE, Goodlin SJ, et al. Screening for cardiovascular disease risk in younger adults: gaps in evidence and future directions. Curr Cardiol Rep. 2021;23(6):63.
11. Karetnikova VN, Neeshpapa AG, Peganova KhA. Traditional and non-traditional risk factors for myocardial infarction in young adults. Russian Med Inq. 2024;8(1):26–30.
12. Rizk T, Blankstein R. Not all heart attacks are created equal: thinking differently about acute myocardial infarction in the young. Methodist Debakey Cardiovasc J. 2021;17:60–7.
13. Borges-Rosa J, Campos G, Martinho S, Almeida J, Gonçalves V, Ferreira C, et al. Myocardial infarction in young adults: are the risk profile and mortality outcomes different from older patients? Eur J Prev Cardiol. 2021;28(Suppl_1):zwab061.083.
14. Dimitrova I. Acute myocardial infarction in young individuals: demographic and risk factor profile, clinical features, angiographic findings and in-hospital outcome. Cureus. 2023;15:e45803.
15. Grauman Å, Veldwijk J, James S, Hansson M, Byberg L. Good general health and lack of family history influence the underestimation of cardiovascular risk: a cross-sectional study. Eur J Cardiovasc Nurs. 2021;20(6):541–9.
16. Stătescu C, Anghel L, Benchea LC, Tudurachi BS, Leonte A, Zăvoi A, et al. A systematic review on the risk modulators of myocardial infarction in the "young"—implications of lipoprotein (a). Int J Mol Sci. 2023;24(6):5927.
17. Pohle CL, Ferreira JS, Coelho RA, Quintal J, Bernardes P, Esteves A, et al. Young patients with acute myocardial infarction: early screening is warranted. Eur J Prev Cardiol. 2024;zwae175.091.
18. Wahrenberg A, Kuja-Halkola R, Magnusson P, Häbel H, Warnqvist A, Hambraeus K, et al. Cardiovascular family history increases the risk of disease recurrence after a first myocardial infarction. J Am Heart Assoc. 2020;10(3):e022264.