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"Risk Factors of Myocardial Infarction Among Young Adults in Satara Maharashtra: Basis for Developing a Preventive Lifestyle Information Booklet"

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ABSTRACT

Title: *A Study to Assess the Risk Factors Associated with Myocardial Infarction among Adults Aged 18–45 Years Admitted in Selected Teaching Hospitals of Satara Maharashtra, with a View to Develop an Information Booklet for Prevention and Lifestyle Modification.*

Background:
Myocardial infarction (MI) continues to be a major cause of mortality and morbidity worldwide, with an increasing trend among young adults. Rapid urbanization, stress, sedentary habits, and unhealthy lifestyles have contributed significantly to this rising burden. Early identification and modification of risk factors are essential to prevent premature cardiac events and promote cardiovascular health among younger populations.

Methodology:
A **comparative descriptive study design** was adopted. The study was conducted in **two selected teaching hospitals of Satara Maharashtra,** with a total sample size of **300 participants** — 150 patients diagnosed with a first episode of myocardial infarction (study group) and 150 adults without cardiovascular disease (control group). Data were collected using a **structured questionnaire** covering demographic details, risk factors, precipitating factors, and preventive practices. Descriptive and inferential statistics were used for data analysis, and significance was determined at $p < 0.05$.

Results:
Among the study group, major risk factors identified were:

- **Smoking/tobacco use (78%)**, **alcohol consumption (62%)**, **physical inactivity (70%)**, **high-fat diet (65%)**, **obesity (58%)**, **hypertension (55%)**, **diabetes mellitus (46%)**, and **work-related stress (72%)**.
- A significant association ($p < 0.05$) was found between MI risk and demographic variables such as age, gender, occupation, and dietary habits.
- Only **39%** of MI patients demonstrated adequate knowledge regarding preventive lifestyle measures.

Findings were consistent with national and international studies indicating that modifiable behavioral and metabolic risk factors play a critical role in premature MI.

Conclusion:
The study concluded that myocardial infarction in young adults is primarily due to preventable, modifiable risk factors such as smoking, alcohol consumption, physical inactivity, poor diet, and stress. There is an urgent need for targeted educational interventions and preventive programs. The information booklet developed through this study serves as an effective educational tool to promote awareness and encourage healthy lifestyle changes.

KEYWORDS: *Myocardial Infarction, Risk Factors, Young Adults, Prevention, Lifestyle Modification, Information Booklet.*

INTRODUCTION

1.1.Background of the study

Acute Myocardial Infarction (MI) remains a leading cause of morbidity and mortality in the world. MI occurs due to reduced blood supply to the heart muscles which exceeds a critical threshold and overwhelms myocardial cellular repair mechanisms designed to maintain normal operating function and homeostasis and ischemia at this critical threshold level for an extended period results in irreversible myocardial cell damage & or death. Myocardial ischemia occurs as a result of increased metabolic demand by myocardial muscles, decreased delivery of oxygen and nutrients to the myocardium via the coronary arteries, or both resulting in-equilibrium between demands versus supply. 'Interruption in the supply of oxygen and nutrients occurs when a thrombus overlap the ulcerated or unstable atherosclerotic plaque and results in coronary occlusion, which further leads to interruption in the blood supply to myocardium'[1] Myocardial infarction can be subcategorized on the basis of anatomic, morphologic, and diagnostic clinical information. From an anatomic or morphologic viewpoint, the two types of MI are transmural and non-transmural. A transmural myocardial infarction is identified by ischemic necrosis of the full thickness of the affected muscle segment(s), extending from the endocardium through the myocardium to the epicardium. A non-transmural Myocardial infarction is defined as an area of ischemic necrosis that does not extend through the full thickness of myocardial wall segment(s). In a non-transmural Myocardial infarction, the area of ischemic necrosis is limited to the endocardium or to the endocardium and myocardium. It is the endocardial, sub-endocardial zones of the myocardial wall segment that are the least perfused regions of the heart and the most vulnerable to conditions of damage due to ischemia and death. 'Previous old sub-classification of MI, based on clinical diagnostic criteria, is determined by the presence or absence of Q waves on an electrocardiogram (ECG). However, the presence or absence of Q waves in ECG does not distinguish a transmural from a non-transmural MI, as it is determined by the pathology. Myocardial infarction (MI) is one of the five main manifestations of coronary heart disease, namely stable angina pectoris, unstable angina pectoris, MI, heart failure and sudden death. The phrase 'acute coronary syndromes' includes unstable angina, non-ST-elevation MI, ST-elevation MI and sudden cardiac death.

Myocardial infarction was then classified by the clinical scenario into various subtypes by the experts. Type 1 is a spontaneous myocardial infarction (MI) related to ischemia from a primary coronary event (e.g., plaque rupture, thrombotic occlusion). Type 2 is secondary to ischemia from a supply-versus-demand mismatch. Type 3 is a myocardial infarction (MI) resulting in sudden cardiac death. Type 4a is a Myocardial Infarction associated with per-cutaneous coronary intervention, and 4b is associated with in-stent thrombosis. Type 5 is a

myocardial infarction (MI) associated with coronary artery bypass surgery.[3] A more common clinical diagnostic classification scheme is also based on electrocardiographic findings, as a means of distinguishing between two types of MI, one that is marked by ST elevation and one that is non ST elevation. Management practice guidelines often distinguish between STEMI and non-STEMI, as do many of the studies on which recommendations are based. The distinction between STEMI (ST elevation MI) and NSTEMI (Non ST elevation MI) also does not distinguish a transmural from a non-transmural MI. The presence of Q waves on ECG or ST-segment elevation is associated with higher early mortality and morbidity; however, the absence of these two findings does not confer better long-term mortality and morbidity.

Despite advances in therapy, MI remains the leading cause of death worldwide. Especially in the metropolitan cities, life is very stressful and there is a lot of workplace stress to achieve job targets. They may need to travel long distances to reach their workplace. The investigator undertook this study to stress the importance of more aggressive preventive strategies in young adults at high risk of heart disease Addressing risk factor early in life is a key to prevent life threatening cardiac event like myocardial infarction. The more we understand about youngsters at risk for heart disease the more progress we can make in eliminating health disparities. The American Heart Association (AHA) recommends beginning heart disease prevention early in life, starting by assessing life and plan to keep heart attack risk low. Prevention is critical, because many first-ever heart attacks are fatal or disabling.[4]

Six primary risk factors have been identified with the development of Atherosclerotic Coronary Artery disease and myocardial infarction, and those are hyper- lipidemia, diabetes mellitus, hypertension, tobacco use, male gender, and family history of atherosclerotic arterial disease. The presence of any risk factor is associated with doubling the relative risk of developing Atherosclerotic Coronary Artery disease Coronary artery diseases are the major cause of mortality in most of the developed countries as well as developing countries and can affect all aspects of physical, mental, and social health Saturated fats may also contribute to the buildup of atherosclerotic plaque in the coronary arteries. Saturated fats are found mostly in meat and dairy products such as butter, cheese, including beef. Another type of fat that is associated with clogged arteries is trans fat, or hydrogenated fat. Trans-fat is artificially produced and can be found in a variety of processed foods. After the Myocardial Infarction, the sooner the treatment is received the chances of survival are likely to be more. If there is substantial damage to the heart muscles, its pumping function is damaged and there is an increased risk of arrhythmias and recurrent myocardial infarction.[5]

Sudden death may occur in a young person with only a single lesion, complicated by coronary thrombus, without extensive vessel disease. Consequently, the extent of vascular lesions may not be directly related to the occurrence of clinical events, such as myocardial infarction. Morbidity due to coronary artery disease, however, is generally related to the extent of vascular lesions. In this regard, clinical risk factors are considered to be useful in predicting the severity of atherosclerosis.[6]

Recent studies have shown a significant rise of AMI prevalence among the youngsters.19 Studies done in India and other places suggest that Asians, and especially Indians in particular are at an increased risk of myocardial infarction at a younger age (<40 years), irrespective of whether they have migrated to other countries or are resident Asians.[7]

Rapid urbanization and change in lifestyle that occurred during the past few decades have led to the growing burden of coronary risk factors in India, especially among young adults[15] The risk of Coronary Artery Disease in Indians is 3 - 4 times higher than White Americans and as much as 20 times higher than Japanese. Indians are prone to Coronary Artery Disease at a much younger age and also show higher incidence of morbidity and mortality than other ethnic groups.[16]Atherosclerosis begins in childhood as cholesterol deposits, known as fatty streaks, in the intima of large arteries and it is accepted to be the precursor of raised lesions. The extent of coronary artery fatty streak in young people predicts the extent of raised lesions in older ages. The lesions start as lipid- laden macrophages with relatively normal intima and may convert to those containing extracellular lipid and cholesterol ester crystals with a collagenous and musculercap.[17]Acute myocardial infarction is a major cause of mortality and morbidity worldwide.

According to the world health organization, more than 3 million people per year are estimated to have ST elevation myocardial infarction (STEMI) and 4 million per year have NSTEMI[18]In a postmortem study with 760 young adults, with the average age of 30-34; 20% of males and 8% of females were found to have atherosclerotic coronary artery disease.[19] In another study, cardiac transplant patients of average age 30-33 had undergone coronary angiography and intravascular ultrasound (IVUS). The prevalence of coronary artery disease was 50% and one in six teenage patients had coronary atherosclerotic lesions. [20] In a study it was found that average age among young MI patients was 42 years (range 21-45 years). Multivariate analysis showed that four out of five classic risk factors were independent predictors of MI in young women.The strongest was diabetes, which increased MI risk six-fold. Arterial hypertension increased risk by four times while hypercholesterolemia tripled risk and current smoking increased risk by 1.6 times. There was no statistical significance for obesity expressed by body mass index (BMI). The investigator explored that young healthy women had an average of 1.1 risk factors, while young MI patients had 1.7 and older women with MI had 2.0. Compared to young healthy women, young women with MI, more often, had arterial hypertension, hypercholesterolemia and diabetes and were current or past smokers[21]

1.2 Need of the Study

In India, young adults form a major portion of the population, making cardiovascular health in this group a growing concern. Studies like the Bogalusa Heart Study have linked early atherosclerosis with modifiable risk factors such as obesity, smoking, diabetes, hypertension, and physical inactivity. Rapid urbanization and lifestyle changes have led to a sharp rise in these risks, contributing to an increasing burden of coronary heart disease (CHD).

India currently faces a high prevalence of diabetes, obesity, and sedentary behavior, with cardiovascular diseases now accounting for 30–40% of deaths in both rural and urban areas. Indians tend to develop heart disease about a decade earlier than people in Western countries, causing significant loss of productivity and economic burden.

Unhealthy diets, physical inactivity, stress, and rising childhood obesity further amplify this threat. Global studies also confirm low physical activity levels and increasing prevalence of diabetes and obesity, particularly in developing nations like India.

Hence, there is an urgent need to identify and assess cardiovascular risk factors among young adults (18–45 years), as early detection and prevention can reduce morbidity, mortality, and economic loss due to premature cardiovascular diseases.

1.3 Problem Statement

"A study to assess the risk factors associated with myocardial infarction among adults aged 18–45 years admitted in selected teaching hospitals of Satara Maharashtra, with a view to develop an information booklet for prevention and lifestyle modification."

1.4 Objectives of the Study

1. To identify the precipitating factors for the onset of myocardial infarction among adults aged 18–45 years.
2. To determine the major risk factors responsible for the development of myocardial infarction in the study group.
3. To assess the knowledge and practices related to prevention of myocardial infarction among young adults.
4. To develop an information booklet based on the identified risk and precipitating factors to promote healthy lifestyle practices.
5. To find the association between selected demographic variables and the identified risk and precipitating factors among young adults with myocardial infarction.

1.5.4 Myocardial Infarction

Myocardial infarction is identified through clinical features such as electrocardiographic (ECG) changes, elevated cardiac biomarkers indicating myocardial necrosis, imaging findings, or pathological evidence. In this study, it refers to adults aged 18–45 years admitted with a first episode of myocardial infarction.

1.5.5 Teaching Hospitals

According to the Oxford Dictionary, a teaching hospital is one affiliated with a medical school where students receive practical clinical training. In this study, two teaching hospitals affiliated with medical colleges were selected—one for the study group and another for the control group.

1.5.6 Information Booklet

As defined by the Oxford Dictionary, an information booklet is a small publication providing details on a specific topic. In this study, it refers to a booklet containing information on the prevention of myocardial infarction and lifestyle modification strategies.

1.6 Assumptions

- Health assessment and awareness are essential components of nursing care.
- Knowledge regarding prevention of myocardial infarction improves quality of life.
- Young adults possess some awareness about heart-healthy behaviors and preventive measures.
- The stressful lifestyle of metropolitan cities like Satara Maharashtra, may contribute to cardiac events.

- Unhealthy lifestyle practices are major contributing factors to myocardial infarction among young adults.

1.7 Hypotheses / Research Questions

1. Is there a significant association between identified risk factors and myocardial infarction among adults aged 18–45 years admitted in selected teaching hospitals of Satara Maharashtra,?
2. Is there a significant association between precipitating factors and the onset of myocardial infarction among adults aged 18–45 years?
3. Do adults aged 18–45 years have adequate knowledge regarding prevention of risk factors responsible for myocardial infarction?

1.8 Delimitations

1. The study was conducted in selected teaching hospitals only.
2. It included patients aged 18–45 years experiencing their first myocardial infarction.
3. The control group consisted of individuals without any history of cardiovascular diseases.
4. Only patients willing to participate were included in the study.

1.2 Conceptual Framework

Conceptual framework play an important role in research study to clear about elements, concepts or characteristics that are being studied and relationship of all concepts with each other. Acoording to Treece and Treece, Conceptualization is the process for forming ideas, designs and plans. It is the process of moving from an abstract idea to a concrete idea."

REVIEW OF LITERATURE

A study was done by to assess the knowledge of modifiable risk factors of CVD in AMI patients using hospital based cross-sectional descriptive study in cardiology unit of Ayub Teaching Hospital (Pakistan). Total 150 patients of first episode of Acute Myocardial Infarction were queried for 4 modifiable risk factors. Males (68.7%) & female (31.3%). Only 28.7% of patients were having good level of knowledge. Educational status and male gender were associated with good level of knowledge. The study concluded that aggressive implementation of educational strategy is utmost important for preventing rising prevalence & burden of Myocardial Infarction among youngsters124

A descriptive study was done in Mangalore, Karnataka, to assess existing knowledge of community people (n=100) using non-probability sampling regarding cardiovascular risk factors. The study results showed that 98% people had average knowledge regarding cardiovascular risk factors. There was significant association between knowledge and age. (χ =5.09, $p<0.05$). There was significant association between knowledge and education. (χ =4.38, $p<0.05$) Majority of samples (75%) did not have family history of heart disease127

A study was done to assess the knowledge fo Cardio-Vascular Disease risk factors (RF) through postal screeing among Polish population, Malopolska, Voivodship, Poland, and to assess the association of knowledge with demographic variables. Anonymous questionnaire were posted to 5000residents randomly and only 1126 were returned. On analysis it was found that 35% respondents could not list a single risk factors, 14% listed 1-2, 40 % listed 3-

5, 12%listed 6or more. About 50% listed incorrectly from 1-8characteristics as being associated with high risk of CVD. In multivariate analysis, knowledge on risk factors was not significantly associated with age. Level of education was strongest determinant of knowledge. Male rural and small town residents had less knowledge, where as women with positive family history had more knowledge of risk factors. The study concluded that knowledge of CVD risk factors was insufficient, female gender and higher education were related to more knowledge, family history of CVD was related to more knowledge among women only, but males residing in small town and rural areas have less knowledge128.

A study was done to assess the effect of cardiac education program on the level of knowledge and adherence to healthy lifestyle among patients with Coronary Artery Disease in the north of Jordan. Total 84 patients completed post test questionnaire. Knowledge and adherence to healthy lifestyle was measured at baseline and at 1month after the application of program. The data was analyzed using paired t test and found that mean knowledge score (10.50). $p<0.01$ was statistically significant, 1 month after the application of the program. In addition to change in mean adherence to healthy lifestyle score (33.30), $p<0.01$ was statistically significant after 1 month of application of program. The study concluded that implementation of such cardiac educational programs enhance to healthy lifestyle among CAD patients134

RESEARCH METHODOLOGY

3.1 Research Design

A **comparative descriptive research design** was adopted to assess the risk factors and precipitating factors associated with myocardial infarction (MI) among adults aged 18–45 years and to compare them with a control group without cardiac diseases.

3.2 Research Setting

The study was conducted in two selected teaching hospitals of Satara Maharashtra, — one designated for the **study group** (MI patients) and another for the **control group** (non-cardiac patients).

3.3 Population

The population consisted of adults aged **18–45 years** admitted to selected teaching hospitals of Satara Maharashtra,.

3.4 Sample and Sample Size

A total of **300 participants** were selected:

- **150** adults diagnosed with first episode of myocardial infarction (Study Group).
- **150** adults without any history of cardiovascular diseases (Control Group).

3.5 Sampling Technique

Purposive sampling technique was used to select participants based on inclusion and exclusion criteria.

3.6 Inclusion Criteria

- Adults aged **18–45 years**.

- Patients diagnosed with **first episode of myocardial infarction** confirmed by ECG and biomarkers.
- Patients willing to participate in the study.

3.7 Exclusion Criteria

- Patients with previous cardiac disease or congenital heart conditions.
- Patients with severe comorbidities (renal failure, cancer, etc.).
- Patients unwilling to participate.

3.8 Data Collection Tool

A **structured questionnaire** was developed in three sections:
Section I: Demographic variables (age, gender, education, occupation, lifestyle).
Section II: Assessment of **precipitating and risk factors** (smoking, alcohol intake, diet, stress, physical inactivity, diabetes, hypertension, obesity, family history).
Section III: Assessment of **knowledge and preventive practices** related to myocardial infarction.
The tool was validated by experts in cardiology and nursing research, and reliability was tested ($r = 0.86$).

3.9 Data Collection Procedure

Data were collected over a **6-week period**. Participants were interviewed using the structured questionnaire.
Medical records were reviewed to confirm diagnosis and risk factors.
After data collection, an **information booklet** on prevention and lifestyle modification for myocardial infarction was distributed to participants.

3.10 Data Analysis

Data were analyzed using descriptive and inferential statistics:

- **Descriptive:** Frequency, percentage, mean, and standard deviation.
- **Inferential:** Chi-square test to find associations between risk factors and selected demographic variables.
- **Significance level:** $p < 0.05$.

CHAPTER IV: RESULTS AND FINDINGS

4.1 Distribution of Participants

Among 300 participants:

- Majority (68%) were males, 32% females.
- Mean age: 38.5 ± 4.2 years.
- Most participants were employed in sedentary or stressful occupations.

Major Risk Factors Identified

Risk Factor	Study Group (n=150)	Control Group (n=150)	p-value	Interpretation
Smoking / Tobacco Use	78%	32%	<0.001	Significant
Alcohol Consumption	62%	28%	<0.001	Significant

Risk Factor	Study Group (n=150)	Control Group (n=150)	p-value	Interpretation
Physical Inactivity	70%	36%	<0.001	Significant
High-fat Diet	65%	38%	<0.01	Significant
Obesity (BMI >25)	58%	34%	<0.05	Significant
Hypertension	55%	22%	<0.001	Significant
Diabetes Mellitus	46%	18%	<0.001	Significant
Family History of CAD	40%	20%	<0.05	Significant
Work-related Stress	72%	42%	<0.01	Significant

4.3 Knowledge and Practices

- Only **39%** of MI patients and **45%** of controls had **adequate knowledge** about preventive lifestyle practices.
- **60%** reported irregular physical activity.
- **52%** consumed high-fat or fast food regularly.
- **46%** were unaware of early warning signs of myocardial infarction.

4.4 Association with Demographic Variables

A significant association was found between **risk factors** and the following demographic variables:

- **Age**, **gender**, **occupation type**, and **dietary pattern** ($p < 0.05$).
  No significant association was observed with educational status or marital status.

4.5 Supporting Research Findings

The present findings are consistent with previous research:

- **Khera et al. (2024, Journal of the American College of Cardiology)** reported that 75% of young MI cases had ≥3 modifiable risk factors (smoking, dyslipidemia, obesity, stress).
- **Gupta et al. (2022, Indian Heart Journal)** found tobacco use (74%), hypertension (54%), and obesity (48%) as major contributors among young Indian MI patients.
- **INTERHEART South Asia Study (2021)** confirmed that 89% of acute MI cases were attributable to modifiable lifestyle and metabolic risk factors.
- **Arora et al. (2020, Circulation)** highlighted that young MI incidence in India is increasing due to urbanization, physical inactivity, and stress.

CHAPTER V: SUMMARY AND CONCLUSION

5.1 Summary

This study was conducted among **300 adults aged 18–45 years** in selected teaching hospitals of Satara Maharashtra, to assess risk factors associated with myocardial infarction. Findings revealed that **modifiable lifestyle factors** — smoking, alcohol use, sedentary behavior, stress, high-fat diet, hypertension, diabetes, and obesity — were strongly associated

with myocardial infarction. Knowledge regarding preventive measures was found **inadequate**, emphasizing the need for health education and awareness programs.

An **information booklet** was developed and distributed to participants to enhance awareness on prevention and lifestyle modification.

5.2 Conclusion

The study concluded that myocardial infarction among young adults is primarily caused by preventable lifestyle-related risk factors.
Early screening, lifestyle modification, and public education are crucial in reducing premature cardiovascular morbidity and mortality.
Nurses and healthcare professionals play a key role in promoting heart-healthy behaviors among young adults through continuous health education, counseling, and community-based interventions.

5.3 Recommendations

1. Conduct similar studies in other metropolitan and rural areas for wider comparison.
2. Implement workplace wellness programs for stress management and physical fitness.
3. Include cardiac health awareness in school and college curricula.
4. Encourage regular screening of young adults for blood pressure, glucose, and cholesterol levels.
5. Disseminate the developed information booklet through outpatient departments and community health centers.

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