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Original Research Article

Analysis of Risk Factors Associated with Myocardial Infarction in Young Patients

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Abstract:

Background: Myocardial infarction among the young population is a social health problem that is new and its occurrence has been on the increase as a result of the influence of lifestyle change, metabolic diseases and hereditary influences. It is crucial to comprehend the risk factor profile of this population group to prevent and manage it early.

Aim: To assess the demographic, clinical, lifestyle, anthropometric, and biochemical risk factors linked with myocardial infarction in young patients.

Methodology: The cross-sectional observational study was carried out in a hospital environment and lasted a year with 120 patients aged 18-45 years having a diagnosis of myocardial infarction. A structured proforma that contained demographic data, clinical history, lifestyle, anthropometric measurements, and laboratory investigations were used to gather the data. The statistical analysis was performed with the assistance of SPSS version 25.0; descriptive and inferential statistics were performed. The p-value of less than 0.05 was considered to be significant.

Results: Most of the patients were males (76.7%) and aged 36-45 years (58.3%). The most prevalent lifestyle risk factors were smoking (56.7%), and sedentary lifestyle (60%). The most common clinical conditions were hypertension (45%), and diabetes mellitus (35%). Abnormal lipid profiles were seen in 68.3% of the patients and 71.6% of the patients were overweight and obese. Significant associations were found between smoking and gender (p=0.001), alcohol consumption and gender (p=0.002), and body mass index with physical activity (p=0.018).

Conclusion: The lifestyle and metabolic risk factors can be modified and are closely associated with myocardial infarction among young patients. In order to reduce the burden of premature cardiovascular disease, there is the necessity to diagnose it at an early stage and implement certain intervention measures.

Keywords: Myocardial infarction, young adults, Risk factors, Smoking, Obesity, Dyslipidemia.

Introduction

Myocardial infarction used to be viewed as a disease of the elderly but over the last few years, its prevalence in young people has become a more and more popular issue of public health [1]. This trend in rising cases of myocardial infarction among people under the age of 45 has been termed as a combination of genetical predisposition, unhealthy lifestyle practices and the rising cases of metabolic disorders [2]. The risk profile of young patients can be different than that of older groups, and smoking, physical inactivity, poor dietary habits, and stress are factors that can be modified and are important [3].

Such conditions as hypertension, diabetes mellitus, dyslipidemia, and obesity have been revealed as having an alarming rising trend among younger populations, and further worsen, increase the likelihood of premature cardiovascular occurrences [4]. Although these are noted, there is still a necessity of specific assessment of risk factors in young patients to enable early detection, prevention, and better clinical outcomes. This is why the current study was conducted to assess the risk factors related to myocardial infarction among young patients.

Background of the Study: Cardiovascular diseases are the major source of morbidity and mortality in all parts of the world and myocardial infarction plays a significant role in this regard [5]. Although traditionally older age groups are also involved, there has been an alarming rate of myocardial

infarction among younger age groups in recent times, especially in developing nations such as India. Such change has mostly been explained by the rapid urbanization [6], the change in lifestyles, the rise in tobacco consumption, physical inactivity, and the rise in the number of metabolic diseases like high blood pressure, diabetes, and dyslipidemia [7]. In contrast to older patients, young people tend to have myocardial infarction in their most productive years with significant social and economic implications [8]. In addition, the aggregation of risk factors that are amenable to change in this population underscores the necessity of early diagnosis and preventive measures. In that regard, the knowledge of the pattern and distribution of risk factors in young patients becomes essential to develop specific interventions and decrease the premature cardiovascular disease burden [9].

Risk Factor Profile of Young Myocardial Infarction Patients: The risk factor profile of young patients with myocardial infarction is typified by a complicated interaction of determinants, both modifiable and non-modifiable, that leads to early development of coronary artery disease [10]. Young people are more influenced by behavior- and metabolic-related risk factors, as compared to the older population, where age-related degeneration is predominantly involved [11]. Smoking stands out as the most noticeable cause that can be accompanied by other poor lifestyle habits like alcohol, lack of physical activity and improper dietary habits [12]. Moreover, clinical conditions such as hypertension and diabetes mellitus are also being noted at earlier age groups, increasing atherosclerotic changes [13]. Another significant percentage of young patients also introduce overweight or obesity, dyslipidemia, which points to a severe metabolic factor underlying the development of diseases [14]. The risk is also increased by family history implying a genetic vulnerability in some individuals [15]. Notably, such risk factors are hardly ever single, they usually get clustered together and the overall risk of cardiovascular diseases becomes highly pronounced. The combination of these lifestyle, clinical and biochemical conditions shows that to prevent myocardial infarction in the young populations, early identification and specific intervention strategies are required.

Research Objectives

The objectives of the study are:

- To determine the demographic character of young patients affected with myocardial infarction.
- To assess the occurrence of clinical risk factors in young patients with myocardial infarction.
- To determine the lifestyle-related risk factors that are related to myocardial infarction among young people.
- To examine the effects of anthropometric and biochemical factors on young patients with myocardial infarction.

Methodology: The current research was done in order to test the risk factors of myocardial infarction in young patients. To ensure reliability and validity of the results a well-structured and systematic procedure was observed.

Study Design: An observational analytical study that was cross-sectional and based at the hospital was carried out. The purpose of the paper was to identify and evaluate various demographic, clinical and lifestyle-related risk factors in young patients diagnosed with myocardial infarction.

Study Area: Research for the study was conducted at Department of General Medicine, Shree Narayan Medical Institute and Hospital, Saharsa, Bihar, India.

Study Duration: The study was conducted over a period of one year.

Study Participants (Inclusion and Exclusion Criteria)

Inclusion Criteria:

- Patients aged between 18 and 45 years
- Patients diagnosed with myocardial infarction based on clinical presentation, electrocardiographic changes, and cardiac biomarkers
- Patients who provided informed consent to participate in the study

Exclusion Criteria:

- Individuals older than 45 years old
- Individuals who have experienced a previous heart attack
- Individuals suffering from cardiomyopathies or congenital heart defects
- Individuals who were not able or willing to provide their informed permission

Sample Size: The study involved a convenient technique of sampling 120 patients who fit the inclusion criteria. The sample was chosen on the basis of the number of eligible patients that were available in the study period and feasibility.

Procedure: The study population was identified and recruited in the cardiology department consecutively, based on the eligibility of patients admitted in the department. With an informed consent, detailed data were gathered with the help of a pre-structured proforma.

Information collected included:

- Socio-demographic information (age, gender, residence)

- Clinical history (hypertension, diabetes mellitus, family history of cardiovascular disease).
- Lifestyle (smoking, alcohol intake, physical activity, nutrition)
- Anthropometric (body mass index) measurements.
- Laboratory tests (lipid profile, blood glucose levels)

The diagnosis of myocardial infarction was made based on the conventional criteria such as electrocardiogram and high levels of cardiac biomarkers.

All data were recorded in an organized manner and ensured to be exhaustive and correct.

Statistical Analysis: Data collected were analyzed and inputted into MS Excel and SPSS version 25.0.

The data was described using descriptive statistics including standard deviation, frequency, mean, and percentage. We used two inferential statistics tests—the chi-square test and the independent t-test—to look for a correlation between the risk factors and myocardial infarction.

P-values, which appeared less than 0.05, were considered as significant.

Results

A total of 120 young patients diagnosed with myocardial infarction were included in the study. The data obtained were summarized to determine the distribution of demographic variables and the risk factors. The results are shown in the tables below.

The demographic data of the sample population were studied to familiarize oneself with the age and gender distribution of the young patients with myocardial infarction.

Table 1: Distribution of Patients According to Age and Gender

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	18–25	12	10.0%
	26–35	38	31.7%
	36–45	70	58.3%
Gender	Male	92	76.7%
	Female	28	23.3%

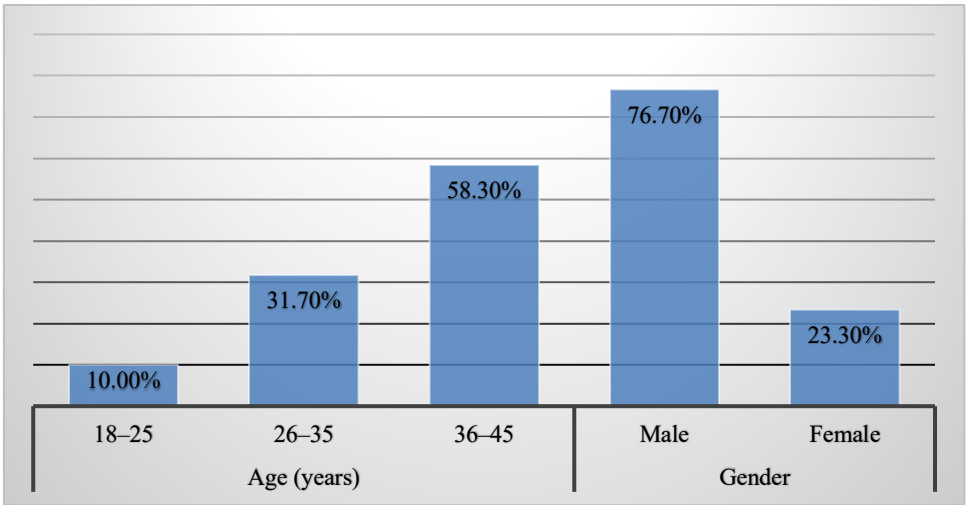

Figure 1: Visual Representation of Distribution of Patients According to Age and Gender

Most of the patients (58.3%, n=70) were aged between 36 and 45 years, which means that most myocardial infarction was clustered in the high end of young people. A higher percentage (76.7, n=92) was observed among males than females (23.3, n=28). The least affected group was 18–25 years (10%, n=12). Such results indicate that there is a high gender bias and age distribution among the young MI patients.

The study participants were evaluated regarding the prevalence of the major clinical risk factors which are shown below.

Table 2: Distribution of Patients According to Clinical Risk Factors

Risk Factor	Present (n)	Percentage (%)
Hypertension	54	45.0%
Diabetes Mellitus	42	35.0%
Family History of CVD	36	30.0%
Total	120	100.0%

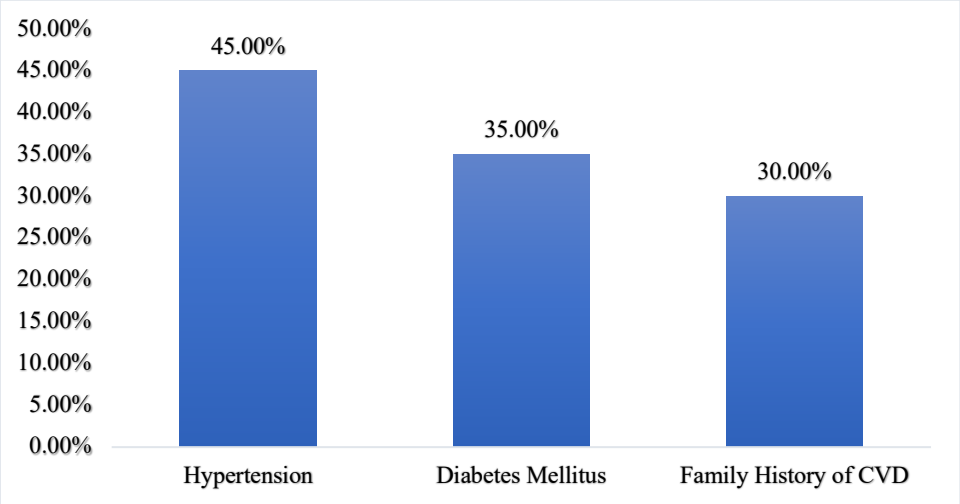

Figure 2: Visual Representation of Distribution of Patients According to Clinical Risk Factors

The most prevalent clinical risk factor was hypertension with 45.0% (n=54) prevalence in patients. There were 35.0% (n=42) diabetes mellitus and 30.0% (n=36) positive family history of cardiovascular disease. The comorbidities are further clustered which can be attributed to high number of metabolic and hereditary predisposing factors even in the young population.

The following risk factors were assessed as being related to myocardial infarction in young patients; lifestyle-related factors.

Table 3: Distribution of Patients According to Lifestyle Risk Factors

Risk Factor	Category	Frequency (n)	Percentage (%)
Smoking	Yes	68	56.7%
	No	52	43.3%
Alcohol Consumption	Yes	50	41.7%
	No	70	58.3%
Physical Activity	Sedentary	72	60.0%
	Active	48	40.0%

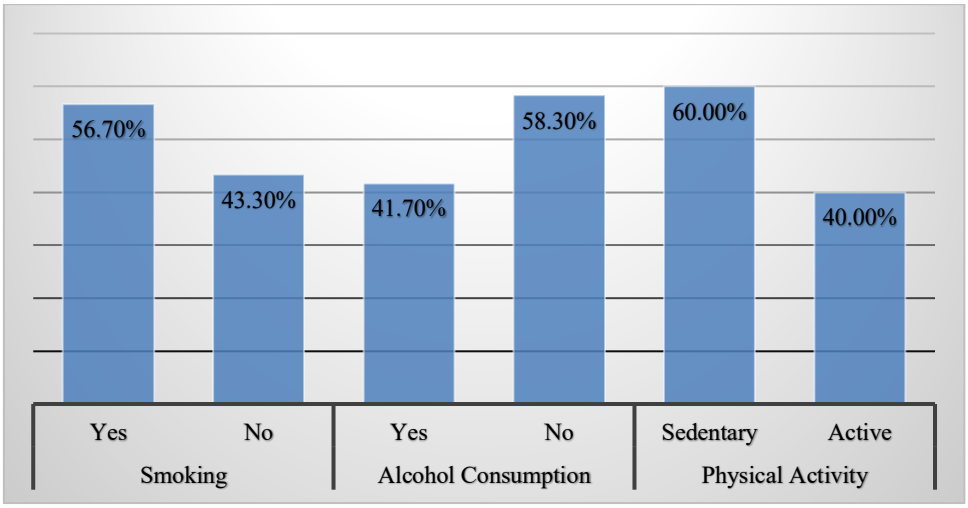

Figure 3: Visual Representation of Distribution of Patients According to Lifestyle Risk Factors

Smoking was also found to be the most common risk factor as reported in 56.7% (n=68) of patients. At 60.0% (n=72) and 41.7% (n=50), respectively, sedentary lifestyle and alcohol consumption were observed. These results indicate that behavioral variables that can be altered were very common and probably played a significant role in the predisposition of myocardial infarction.

The patient distribution according to the body mass index was examined to determine the impact of risk associated with obesity.

Table 4: Distribution of Patients According to Anthropometric Measurements

Variable	Category	Frequency (n)	Percentage (%)
BMI	Normal (18.5–24.9)	34	28.3%
	Overweight (25–29.9)	52	43.3%
	Obese (≥30)	34	28.3%

A large proportion of patients were either overweight (43.3%, n=52) or obese (28.3%, n=34), while only 28.3% (n=34) had normal BMI. This implies that among the patient's 71.6 percent of them were overweight. The statistics indicate a high correlation exists between high BMI and myocardial infarction among the young people.

Laboratory parameters were analysed to discover whether myocardial infarction was caused by metabolic abnormalities.

Table 5: Distribution of Patients According to Laboratory Findings

Parameter	Category	Frequency (n)	Percentage (%)
Lipid Profile	Normal	38	31.7%
	Abnormal	82	68.3%
Blood Glucose	Normal	66	55.0%
	Elevated	54	45.0%

One of the most notable biochemical abnormalities was abnormal lipid profiles observed in 68.3% (n=82) of the patients. Forty-five percent (n=54) patients had elevated blood glucose levels. These results suggest that dyslipidemia and poor glycemic regulation is very common with young MI patients. The correlation between risk factors, which were selected, and genders was conducted to determine whether there were any significant differences.

Table 6: Association Between Selected Risk Factors and Gender

Risk Factor	Male (n=92)	Female (n=28)	P-value
Smoking	64	4	0.001
Alcohol Consumption	46	4	0.002
Hypertension	42	12	0.321
Diabetes Mellitus	30	12	0.210

Smoking was more commonly found in males (n=64) as compared to females (n=4) and the relationship was statistically significant (p=0.001). Similarly, the alcohol use was higher among males (n=46) than females (n=4) and the difference between the two was also found to be significant (p=0.002). Nevertheless, hypertension (p=0.321) and diabetes mellitus (p=0.210) did not show any significant gender association. This implies that there were gender differences in lifestyle issues, but even distributions in clinical states.

There was a correlation of body mass index with levels of physical activity among the study participants.

Table 7: Association Between BMI and Physical Activity

BMI Category	Sedentary (n=72)	Active (n=48)	P-value
Normal	14	20	0.018
Overweight	32	20	
Obese	26	8	

The percentage of sedentary individuals who were overweight (n=32) or obese (n= 26) were greater compared to active individuals. The group with the highest level of obesity was the sedentary group (26 vs 8). The relationship between physical activity and BMI were statistically significant (p=0.018). It means that the low levels of physical activity are closely associated with the increased BMI in younger patients of myocardial infarction.

Discussion

The current investigation revealed that myocardial infarction among the young people was more common in age category of 3645 years (58.3%) and mostly affected males (76.7%). This gender preponderance is not new in the literature as past literature has indicated that myocardial infarction is more prevalent in young males because they are exposed to behavioral risks (smoking, alcohol consumption). According to a review conducted by Shah et al. (2016), male gender, smoking, and family history are some of the distinguishing features of myocardial infarction in young people (Shah et al., 2016) [16]. Also, a cohort-based study by Yang et al. (2019) has also indicated a greater percentage of males in young patients with myocardial infarction, which supports the gender gap found in the current study (Yang et al., 2019) [17]. These results indicate the usefulness of demographic profiling in the determination of high-risk populations, which is in line with the purpose of the study, which is to determine patient characteristics.

In the study, clinical and lifestyle risk factor analysis revealed that smoking (56.7%), sedentary lifestyle (60%), hypertension (45%), and diabetes mellitus (35%), were predominant among the young patients with a myocardium infraction. These results are closely consistent with the results of the study carried out by Sapkal et al. (2020), with smoking (68%), and dyslipidemia (64%) being the most frequently detected risk factors in young patients with myocardial infarction (Sapkal et al., 2020) [18]. Similarly, as a huge cohort study carried out by Biery et al. (2020) showed, more than half of patients with the myocardial infarction in the youth population were active smokers, which demonstrated a pressing necessity to pay attention to the use of tobacco as one of the first factors in the development of the disease (Biery et al., 2020) [19]. An additional source also pointed out that the conventional risk factors like smoking, diabetes, and hypertension also play a significant role in premature atherosclerosis among young people (Wu et al., 2020) [20]. The modifiable risk factors are high in the current study; a clear indication that behavioral aspects related to lifestyle dominate the leading factor in the early occurrence of myocardial infarction.

Moreover, the study found a significant prevalence of metabolic abnormalities with 71.6% of the patients being overweight or obese and 68.3% having abnormal lipid profiles. It was also discovered that there exists a significant relationship between sedentary lifestyle and high body mass index ($p=0.018$) that implies the relationship between anthropometric and behavioral risks. The results are consistent with the past literature that has already shown that among young patients of myocardial infarction, obesity and dyslipidemia are becoming more common and are a significant risk factor of cardiovascular disease.

Conclusion

It was concluded in the present study that myocardial infarction was more common in young patients (mainly male) and in the age range of 36 - 45 years, which clearly demonstrates a demographic susceptibility. It was discovered that the prevalence of modifiable risk factors, particularly smoking, sedentary lifestyles, hypertension and diabetes mellitus have been very high, and are therefore highly contributing to the onset of diseases at a very tender age. Additionally, the majority of the patients had abnormal metabolism, including overweight/obesity and dyslipidemia, which further supports the role of combined risk factors burden. The correlations between lifestyle behaviour and clinical parameters found, reflect the co-dependence of behavioural and physiological determinants of myocardial infarction. Overall, the findings indicate that early identification of risk factors and individual lifestyle modifications, as well as prevention against the problem, are rather urgent steps toward reducing the cases of myocardial infarction in young people.

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