

FACTORS IMPACTING MYOCARDIAL INFARCTION IN YOUNG POPULATION: AN INSTITUTION BASED EXPERIENCE

Fatimah,¹ Athar Nayeem,² Afia Sarwar,³ Atiya Begum,⁴ Sidra Shafiq Cheema⁵

Abstract

Background and Objective: Ischemic heart disease is currently the largest cause of mortality, disability, and human misery worldwide. South Asians have an increased chance of suffering from coronary disease. The objective of this study was to assess the prevalence and risk factors for myocardial infarction in young population.

Methods: A Descriptive, cross-sectional study was carried out over a six-month period from 17th January 2020 to 16th July 2020 in the Medical Unit-II of Services Hospital, Lahore. A total population of 149 young patients irrespective of their gender with age range from 15 to 45 years and suffering from myocardial infarction were included in this study. Relevant information comprising of presence or absence of Hypertension, Diabetes, Smoking, Dyslipidemia, Obesity, Hyperuricemia, and Family history of these selected cases were recorded in the data collection proforma and patients' confidentiality was ensured.

Results: 101 men (67.79%) and 48 women (32.21%) among a total of 149 patients recruited in the study yielded a male to female ratio of 2.1:1. Age range in this study was from 15 to 45 years with mean age of 34.68 ± 6.93 years. Majority of the patients; 80 (53.69%) were between 30 to 45 years of age. Hypertension was reported in 57 (38.26%), Diabetes Mellitus in 28 (18.79%), smoking in 61 (40.94%), dyslipidemia in 80 (53.69%), obesity in 20 (13.42%), hyperuricemia in 21 (14.09%) and positive family history was seen in 30 (20.13%) patients.

Conclusion: Hypertension, Diabetes, Smoking and Dyslipidemia constitute the common and most important contributing factors of Myocardial Infarction (MI) in young patients aged between 15 to 45 years.

Keywords: Myocardial Infarction, young patients, factors.

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Ischemic heart disease is currently the largest cause of mortality, disability, and human misery worldwide¹ South Asians have an increased chance of suffering from coronary disease. According to studies, South Asians initially encounter a myocardial infarction roughly ten years earlier than people from other nations.^{2,3} Pakistani population is one of the world's high-risk populations for Coronary Heart Disease (CHD).³

According to the most recent WHO data, published in 2020, the number of Coronary Heart Disease deaths in Pakistan reached 240,720, accounting for 16.49% of total deaths.⁴

Globally, the main risk factors include smoking, high blood pressure, hyperlipidemia, and a favorable family history.⁵ Hypertension (defined as two blood pressure readings above 130/80 mmHg measured 24 hours apart) is another major risk factor that has a continuous age-related risk of mortality from ischemic heart disease.^{6,7}

According to estimates, 382 million individuals worldwide have diabetes, which is characterized by two consecutive blood tests showing fasting blood sugar levels greater than 126 mg/dl. It affects one in four patient hospitalized for acute myocardial infarction.⁸

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Additionally, complications are more likely to occur in diabetic patients who experience myocardial infarction.⁹

One in five deaths in the United States are directly attributable to smoking (defined as smoking more than three cigarettes per day for the previous year). This equates to about 480,000 deaths each year. The majority of these fatalities involve MI10, not just in the US but also in other nations. Due to its link to later cardiovascular illness, obesity (defined as a BMI > 30 kg/m²) has emerged as a serious health risk. When compared to controls of the same age and gender, MI patients are reported to have higher body mass indices and more central obesity.^{11,12}

Previous clinical investigations have demonstrated that there is a close relationship of hyperuricemia (Serum Uric Acid levels more than 10mEq/l in men and more than 12mEq/l in women) and dyslipidemia (Serum Triglyceride levels greater than 150mg/dl, Serum Low-density Lipoproteins (LDL) levels greater than 100mg/dl, and Serum High-density Lipoproteins (HDL) levels less than 40mg/dl).¹³ The nature of the association between hyperuricemia and CHD and whether it is an independent risk factor for CHD are both unknown.¹⁴ Current recommendations emphasize using a statin (a lipid-lowering medicine) as a primary and secondary intervention setting.¹⁵ The connection between family history and MI is stronger when compared to controls of the same age and gender because it represents familial predisposition and lifestyle habits shared between families.^{11,12}

Despite the fact that South Asians have higher rates of earlier chronic heart diseases, little research has been done on this population. The vast majority of the data pertain to the migratory South Asian community. Exploring the innate genetic, ethnic, social, educational, and lifestyle variations that make Pakistanis distinct and more prone to Acute Myocardial Infarction at younger ages is necessary. Given the lack of information on the young Pakistani population, the purpose of this study is to ascertain how frequently MI contributing variables occur. To help with earlier detection of risk factors and their quick management, it is necessary to produce local statistics and data.

METHODS

This descriptive cross sectional study was conducted over a period of six months (January to July 2020) at Medical Unit-II of Services Hospital, Lahore. Sample size was calculated using OpenEpi calculator. After seeking permission (CPSP/REU/MED-2017-C678-12787; REU No: 38343), 149 young patients with myocardial infarction of either sex between the ages of 15 and 45 were chosen, and each of them provided their consent. On the basis of current WHO guidelines^{16,17} mainstay of diagnosing MI was based on clinical characteristics, ECG findings, and levels of cardiac biomarkers; those who met these requirements were included in the study. Young patients with history of any heart illness supported by medical records, those who were unable to give consent, and those transferred from a different institution were excluded from the study.

The relevant information to be recorded was filled in the data collection proforma i.e., hypertension, diabetes, smoking, dyslipidemia, obesity, hyperuricemia and family history of the selected cases. Patients' privacy was ensured. SPSS Version 20 was used for data analysis. Age & body mass index were computed using Mean and Standard Deviation. Gender, family history, smoking, diabetes, hypertension, hyperuricemia, and dyslipidemia were taken into account while calculating frequency and percentage. Stratification was used for managing age and gender. Chi-square was employed after stratification, with p-values less than or equal to 0.05 considered statistically significant.

RESULTS

101 men (67.79%) and 48 women (32.21%) among a total of 149 patients recruited in the study yielded a male to female ratio of 2.1:1. Age range was from 15 to 45 years with mean age of 34.68 ± 6.93 years. Majority of the patients; 80 (53.69%) were between 30 to 45 years of age. Diabetes mellitus was identified as a contributing factor in 28 (18.79%), hypertension in 57 (38.26%), obesity in 20 (13.42%), smoking in 61 (40.94%), hyperuricemia in 21 (14.09%), dyslipidemia in 80 (53.69%), and family history in 30 (20.13%) study

participants. As indicated in Fig I, the frequencies differed between genders. Table I and II demonstrate stratification of components based on age and gender.

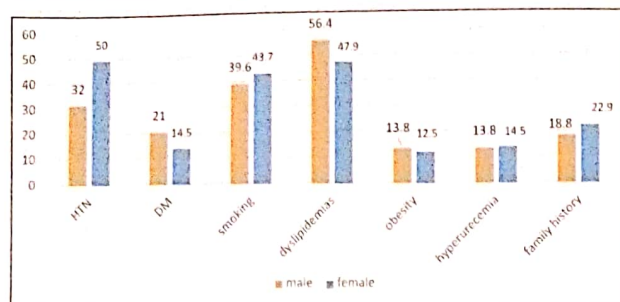


Figure I: Percentage of different contributing risk factors

Table 1: Stratification of age-related risk variables

Contributing factors		Age range 15-30 years (n=69)	Age range 31-45 year (n=80)	P-value
Hypertension	Yes	14	43	0.0001
	No	55	37	
Diabetes Mellitus	Yes	06	22	0.003
	No	63	58	
Smoking	Yes	17	44	0.0001
	No	52	36	
Dyslipidemia	Yes	25	55	0.0001
	No	42	25	
Obesity	Yes	07	13	0.276
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Hyperuricemia	Yes	07	14	0.198
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Family history	Yes	10	20	0.111
	No	59	60	

DISCUSSION

Atherosclerotic plaque leading to Coronary artery obstruction is the main pathology underlying the ischemic attack. Rupture of this plaque in some instances while physiologic stress in the form of trauma, blood loss, anemia or infection, increasing the demand of blood supply may lead to myocardial infarction.¹⁸ Diagnosis of acute myocardial infarction is based upon appearance of cardiac biochemical markers in addition to clinical symptoms and classical ECG findings.^{16,17}

The incidence of myocardial infarction as well as case fatality is declining in the Western world with

Table 2: Gender stratification of variables

Contributing factors		Male (n=101)	Female (n=48)	p-value
Hypertension	Yes	33	24	0.042
	No	68	24	
Diabetes Mellitus	Yes	21	07	0.365
	No	80	41	
Smoking	Yes	40	21	0.631
	No	61	27	
Dyslipidemia	Yes	57	23	0.330
	No	44	25	
Obesity	Yes	14	06	0.820
	No	87	42	
Hyperuricemia	Yes	14	07	0.906
	No	87	41	
Family history	Yes	19	11	0.559
	No	82	37	

the use of more sensitive cardiac markers for diagnosis.¹⁹ In the past few years, rate of AMI is declining in adult population worldwide however no such shift in trend has been observed in young adults.^{20,21} Therefore, finding out the possible causative agents in young individuals is important for planning screening and prevention strategies.

Our study involved 149 subjects irrespective of gender. Age ranged from 15 to 45 years with mean age of 34.68 ± 6.93 years. 101 were (67.79%) males and 48(32.21%) were females with a male to female ratio of 2.1:1. Male dominance was also seen in other studies.^{22,23} Data stratification didn't reveal a significant difference in terms of obesity ($p=0.276$), hyperuricemia ($p=0.198$) and family history ($p=0.11$).

A significant association was found between hypertension, smoking & dyslipidemia ($p=0.0001$) and diabetes ($p=0.0003$) The results of a study conducted in India involving 50 young adults with MI reported smoking (56%), obesity (26%), dyslipidemia (76%) and family history (36%) as contributing factors of MI.²⁴ Young adults with acute episode of myocardial ischemia vary from that of elderly individuals in terms of underlying cause, angiography results, and prognosis.²¹

Diabetes and hypertension have been identified as significant causative component in both older and

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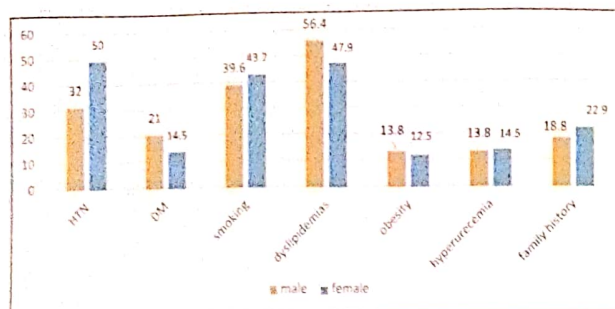


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Diabetes and hypertension have been identified as significant causative component in both older and

younger populations experiencing acute MI. The results of our study also highlight hypertension and diabetes as most important contributing factors to MI. Although hypertension is common in elderly people, the unfortunate consequences is significant in younger population. Therefore timely detection and proper management is must. In one study majority of participants had impaired blood sugar and glycated hemoglobin levels and therefore concluded glycated hemoglobin levels as independent variable for coronary disease.¹⁸

Our study revealed smoking also contributed to a significant number of acute MI in young patients and this finding is consistent with previous studies¹⁹. Previous research revealed that coronary artery spasm caused by smoking could result in transitory arterial obstruction, clot development, or both. Study conducted in 44 hospitals in Michigan concluded smoking as an important etiological cause of acute MI in young and the cessation can cause a drastic decline in cases of acute MI in this population.²⁵ Moreover, the advantage of smoking cessation is related to the number of smoked cigarettes,²⁰ hence figuring out the possibility of smoking as a key risk factor is of prime importance. Conducting awareness campaigns covering the beneficial aspects of quitting smoking may be effective in lowering the incidence of infarction.

Another significant cause for IHD is dyslipidemia. 53.69% of the patients in our study had dyslipidemia, while 63.2% of participants had it in Akhtar et al²¹ and is comparable to Bachok et al²⁶. Although the cause of the rising prevalence of dyslipidemia is unknown, genetic and dietary factors appear to be significant. Kragelund et al came to the conclusion that central obesity was a fixed factor in these patients' deaths.²³

Sedentary lifestyle and unhealthy eating routine can result in deranged lipid profile and truncal obesity. A meta-analysis of 77 studies on risk factors for premature MI has identified obesity and dyslipidemias as a major modifiable cause of MI in young patient population.²⁷ Several studies reported consumption of beef and lack of adequate dietary fiber was more pronounced in young people as compared to the elderly

group.²⁵

A higher risk of early coronary events is conferred by genetic predisposition. In our case, 20.13% of patients had a favorable family history. Onset of early atherosclerosis in first- and second-degree relative appeared to be a major factor in defining the risk of cardiovascular events in young.²⁸

CONCLUSION

This study concluded that hypertension, diabetes, smoking, and dyslipidemia are substantial risk factors for Myocardial Infarction in young people aged 15 to 45. As a result, we believe that early identification and management of these risk factors in young adults should be routinely performed in order to reduce the risk of MI. The call to action for further research and implementation of personalized prevention strategies is crucial in achieving this goal. By doing so, we can ensure that healthcare disparities are addressed and that individuals receive tailored care that meets their unique needs. Furthermore, regional and national public awareness campaigns should be organized to educate our young people about the importance of changing their sedentary and luxurious lifestyles in order to prevent MI, which will lead to a reduction in mortality and morbidity in our community.

Conflict of Interest

None

Source of Funding

None

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