Identify Common Risk Factor and Clinical Presentation of Myocardial Infarction Among Male and Female Adults in Saudi Arabia

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Abstract

Data on the epidemiology of myocardial infarction (MI) risk factors in Saudi Arabia are limited, particularly in relation to age at MI onset. Therefore, this study aimed at evaluating the prevalence of MI risk factors, as well as MI presentation in the central region of Saudi Arabia.

 A cross-sectional survey was conducted between – to – 2019 in a sample of 103 patients with MI. A self-administered and structured questionnaire assessing the participants' baseline characteristics and MI-related risk factors and symptoms was employed. The analysis included descriptive statistics and chi-square analysis.

There were 55 (53.4%) male participants and 48 (46.6%) female participants. Their age ranged 16 to 86 years, with a mean age of 55.5 ± 14.8 years. Seventy-one (68.9%) patients were above 45 years of age. The most common risk factors for MI were hypertension (58.2%), diabetes mellitus (59.2%), obesity (45.6%), physical inactivity (36.9%), smoking (36.9%), and hypercholesteremia (33.0%). Patients aged above 45 years of age were more likely to report an established diagnosis of diabetes mellitus, hypertension, and hypercholesteremia (all $P <0.05$). the most common reported MI region was inferior wall MI.

MI risk is high among young Saudi adults. Diabetes mellitus, hypertension, and hypercholestermia were significantly more common in older patients with MI. addressing the modifiable risk factors for MI is vital to early prevention of MI.

Keywords: myocardial infarction, risk factors, age, Saudi Arabia

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1. Introduction

Globally, acute myocardial infarction (MI) is one of the major causes of morbidity and mortality. The burden is more significant when the patients are young as they are in the most flourishing stages of their life and have the potential to contribute to their family and society (1–7). Though noticeably limited, observational reports suggest that acute MI occurs in around 2% to 10% of young adults (8).

Particular risk factors have been found to be commonly associated with MI in this age group, including male gender, smoking, and hyperlipidemia (2,3,9–11). Family history of ischemic heart disease and hypertension have also been reported as common risk factors (12).

In a recent prospective cohort study, the classical presentation of acute MI in adult patients, the chest pain is the main symptom and represents of 91.6% of cases and the proportion of young adults (35 years or younger) with acute coronary syndrome represented 195 (0.7%) of a total population of 28, 778 patients (13). These findings emphasize the recurrent question about the need for and timing of coronary angiography in young patients who have lower probability of MI given their fewer coronary risk factors (14). This has led to a trending belief that the global risk of cardiovascular diseases in this population may be underestimated (15).

Epidemiological studies of MI presentation and risk factors in this population are lacking. A retrospective study conducted by Al-Khadra (2003) included 65 patients (23.1% Saudis) supported the aforementioned common risk factors in addition to diabetes (30.8%). The vast majority of cases (92.3%) were MI with ST elevation and the anterior wall was the most common anatomical location of the MI (16). The present study aimed to assess the clinical presentation of and to evaluate the risk factors for acute MI in Saudi young adults younger than 45 years old.

2. Methods

"This is a cross-sectional study of MI risk factors and clinical presentation in male and female patients under 45 years in Riyadh region, Saudi Arabia. The study was conducted between – to – 2019, using a structured and self-administered questionnaire was randomly distributed among a sample of 103 MI patients. Participation was entirely anonymous and voluntary, and participants were asked to provide informed written consent before participation. The study was approved by the Ethics Committee of Majmaah University.

The questionnaire incorporated questions on the participants' baseline characteristics (sex, age, marital status, and employment status). In addition, MI risk factors, such as diabetes mellitus (DM), hypertension (HTN), smoking, physical inactivity, etc. were assessed using self-reported multiple-choice questions. Participants were also asked about the region of MI and some clinical data, such as electrocardiogram (ECG) findings and enzymatic changes. Family history of coronary artery syndrome (CAD) was also assessed.

The mean and standard deviation was calculated for continuous variables. Categorical variables were presented as frequencies and percentages. Data were analyzed using the Statistical Package of Social Sciences (SPSS) Version 20 (SPSS, IBM Corp., Armonk, NY, USA).

3. Results

There were 55 (53.4%) male participants and 48 (46.6%) female participants aged 16 to 86 years, with a mean age of 55.5±14.8 years. A total of 70 (68.0%) participants were married, 17 (16.5%) were Divorced/widowed (widower), and 16 (15.5%) were single. Regarding employment status, 64 (62.1%) were not employed, 24 (23.3%) were employed, 11 (10.7%) were retired, and 4 (3.9%) were student (Table 1).

Table 1 Baseline demographic characteristics of the study population (N =103)		
Characteristics	N	%
Age (years)		
Range	16 ─ 86	
Mean±SD	55.5±14.8	
Gender		
Male	55	53.4
Female	48	46.6
Marital status		
Single	16	15.5
Married	70	68.0
Divorced/widowed(widower)	17	16.5
Employment status		
Employed	24	23.3
Student	4	3.9
Not employed	64	62.1
Retired	11	10.7
SD: standard deviation.		

Table 2 shows the distribution of risk factors in patients with MI. More than two-thirds (68.9%) were above 45 years of age. Hypertension was observed in 58.2% of the participants, diabetes mellitus in 59.2%, obesity in 45.6%,

physical inactivity in 36.9%, smoking in 36.9%, and hypercholesteremia in 33.0%. A combination of these risk factors was self-reported by some patients and is shown in Table 2.

Table 2 Distribution of risk factors in patients with MI		
Risk factor	N	%
Age at MI (years)		
45 or below	32	31.1
Above 45	71	68.9
DM	61	59.2
HTN	60	58.2
Obesity	47	45.6
Physical inactivity	38	36.9
Smoking	38	36.9
Hypercholesteremia	34	33.0
Family history of CAD	14	13.6
HTN + DM + obesity	23	22.3
DM + Hypercholesteremia + obesity	15	14.6
DM + physical inactivity + obesity	10	9.7
HTN + DM + Hypercholesteremia + physical inactivity	8	7.8
physical inactivity + smoking	7	6.8
MI: myocardial infarction, HTN: hypertension, DM: diabetes mellitus, CAD: coronary artery disease.		

Various risk factors for MI were compared between participants in different age groups. The analysis showed that patients who had MI after 45 years of age were more likely to self-report having DM, HTN, and hypercholesteremia (all $P <0.05$). No significant difference was found between different age groups and other risk factors for MI (Table 3).

Table 3 Distribution of risk factors in patients with MI, by age at MI onset			
Risk factor	Age at MI		
	45 or below (N =32)	Above 45 (N =71)	P
DM	43.8	70.4	0.015
HTN	40.6	64.8	0.031
Obesity	43.8	43.7	1.000
Hypercholesteremia	21.9	43.7	0.047
Smoking	43.8	25.4	0.070
Physical inactivity	46.9	38.0	0.516
Family history of CAD	3.1	15.5	0.098
MI: myocardial infarction, HTN: hypertension, DM: diabetes mellitus, CAD: coronary artery disease.			

Table 4 shows MI symptoms as reported by the study subjects. Palpitation was more likely to be reported by older patients than youngers (P <0.01). The analysis detected no other significant differences in MI symptoms among patients from different age groups (Table)

Table 4 Distribution of MI symptoms, by age at MI onset				
Symptom		Age at MI		
	Total (N =103)	45 or below (N =32)	Above 45 (N =71)	*P*
Chest pain	45.6	53.1	42.3	0.393
Chest pain radiating to neck, shoulders, or arms	46.6	40.6	49.3	0.523
Palpitation	36.9	15.6	46.5	0.004
Sweating	43.7	40.6	45.1	0.830
Fatigue	31.1	34.4	29.6	0.651
Nausea	35.9	37.5	35.2	0.828
Shortness of breath	53.4	50.0	54.9	0.674
Vomiting	18.4	15.6	19.7	0.786

Inferior MI was reported by 18.4% of the participants, anterior MI by 13.6%, and lateral MI by 10.7%. MI involving more than one side was reported by 13.6%. ECG and enzymatic changes were reported by 43.7% and 49.5%, respectively (Table 3).

Table 5 Characteristics of MI among the study population		
Characteristics	N	%
Side		
Inferior	19	18.4
Lateral	11	10.7
Anterior	14	13.6
more than one side	14	13.6
Not known MI	45	43.7
ECG changes	51	49.5
Enzymatic changes	55	53.4
MI: myocardial infarction.		

4. Discussion

   The present retrospective investigation was performed on a sample of MI patients in central region of Saudi Arabia. The most common risk factors were age above 45 years, diabetes mellitus, hypertension, obesity, physical inactivity, and smoking. These traditional risk factors for MI affected more than one-third of the surveyed patients, a finding similar to what has been shown by Framingham Heart study (17) the INTERHEART study (18), and several previous studies (19–21). The study identified that 6.8% to 22.3% of the subjects represented a high risk group, who had three of more risk factors for MI. Notably, as much as 23.3% were obese and reported an established diagnosis of diabetes mellitus and hypertension. The main aim of this study was to compare MI presentation and risk factors between patients under 45 years of age and those aged 45 years and above. Our findings suggested that older patients significantly suffered from diabetes, hypertension, and hypercholesteremia more than did younger patients (P <0.05). Age was of a weak effect on MI presentation in this survey, as only one symptom (palpitation) was more likely to be reported by older subjects.

While age is a well-known risk factor for MI, we found a considerable proportion of young adults (<45 years) suffering from MI. Previous research has pointed to the increasing incidence of MI among people younger than 45 years (20). These findings are concerning, as having MI at such age can have negative impact on social, psychological (22), and productivity of the patients (23), in addition to the quality of life of patients and their relatives (24) and related economic consequences (25).

Although insignificant, the analysis showed that patients below 45 years of age reported obesity, smoking, and physical inactivity more commonly than did older patients. All of these risk factors for MI are modifiable, therefore, early identification of them and prevention are vital strategies to MI prevention (26).

Inferior wall was the most common side affected among the surveyed population (18.4%). Inferior wall MI occurs

from occlusion of the coronary artery that results in decreased perfusion to the inferior myocardium. MI involving the inferior wall occurs in approximately 40% of all MIs and it is associated with a better prognosis than MIs in other regions, such as anterior MI (27–29). However, these findings were self-reported and may lack accuracy, which is a limitation of the study. Other limitations include the relatively small sample size and the use of a self-reported questionnaire.

5. Conclusion

We conclude that MI risk is high among young Saudi adults. DM, HTN, and hypercholesteremia were significantly more common in older patients with MI. A considerable proportion of young patients (<45 years) had modifiable MI risk factors, such as obesity, physical inactivity, and smoking. Therefore, addressing the modifiable risk factors for MI is vital to early prevention of MI.

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