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THE INCIDENCE OF MYOCARDIAL INFARCTION IN YOUNG PATIENTS WHO WERE ADMITTED INTO THE CORONARY CARE UNIT OF AL-YARMOUK TEACHING HOSPITAL

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ABSTRACT

Background: Younger folks are frequently diagnosed with myocardial infarction (MI), which mostly affects people over 45. Young-onset MI causes significant morbidity, psychological, and financial difficulties on patients and their families. World Health Organization criteria for MI include an increase in cardiac troponin, characteristic symptoms, electrocardiographic abnormalities, pathological Q waves, or coronary intervention. Objective: This study estimated the frequency of myocardial infarction in young patients under 45 years old and assessed their clinical features and risk variables. **Patients and Methods:** The coronary care unit at Al-Yarmouk Teaching Hospital accepted 595 acute myocardial infarction patients between April 2010 and January 2011 for a cross-sectional research. Enrolling all consecutive MI patients during the research was convenient, non-random sampling. Data were obtained using a standardized questionnaire that comprised demographics, clinical presentation, cardiovascular risk factors, physical assessments, and biochemical tests. **Results:** 10% of the 595 acute myocardial infarction patients were under 45. In patients under 45 years old, males made up 90% and females 10%, whereas in those over 45, males made up 65% and females 35% ($p = 0.0001$). Chest discomfort was the most prevalent symptom in 85.1% of young patients and 70.1% of older individuals. Smoking (90%) and a positive family history of coronary artery disease (40.2%) were the biggest risk factors for younger patients ($p = 0.008$ and 0.001, respectively), whereas diabetes and hypertension dominated older individuals. Infarction site did not differ by age ($p = 0.672$). **Conclusion:** Myocardial infarction in young adults is not uncommon, occurs predominantly in males, and is strongly associated with smoking and a positive family history of coronary artery disease.

KEYWORDS: Myocardial, infarction, young, coronary care unit.

INTRODUCTION

Myocardial infarction (MI) is defined as a clinical or pathological event resulting from myocardial ischemia, accompanied by evidence of myocardial injury or necrosis, as reflected by cardiac biomarkers, electrocardiographic changes, or imaging findings.[1,2] It occurs when myocardial oxygen supply becomes insufficient to meet metabolic demands, leading to cellular injury that may progress to irreversible myocardial necrosis if ischemia is prolonged. This imbalance may arise from reduced coronary blood flow, increased myocardial oxygen demand, or a combination of both.[3] The most common underlying mechanism is atherosclerotic plaque disruption with superimposed thrombus formation causing partial or complete coronary artery occlusion. Less frequently, MI may result from severe fixed coronary stenosis, coronary vasospasm, or embolic phenomena that critically impair myocardial perfusion.[3] From a pathological perspective, myocardial infarction is traditionally classified into transmural and non-transmural types. Transmural MI involves full-thickness necrosis of the myocardial wall extending from

the endocardium to the epicardium, whereas non-transmural MI is limited to the subendocardial layers without full wall involvement.[4] Clinically, MI is further classified according to electrocardiographic findings into ST-segment elevation myocardial infarction (STEMI) and non-ST-segment elevation myocardial infarction (non-STEMI), a distinction that has important implications for management and prognosis.[5] To standardize diagnosis, a universal definition of MI was introduced, emphasizing the presence of myocardial necrosis in a clinical context consistent with myocardial ischemia.[2] Several well-established risk factors contribute to the development of atherosclerotic coronary artery disease and MI. These include hyperlipidemia, hypertension, tobacco use, diabetes mellitus, male gender, and a positive family history of premature coronary artery disease. The presence of any single major risk factor approximately doubles the relative risk of developing coronary artery disease.[3] Elevated total cholesterol, low-density lipoprotein cholesterol, triglycerides, and low levels of high-density lipoprotein cholesterol are strongly associated with coronary atherosclerosis.[6] Hypertension and diabetes mellitus accelerate atherosclerotic progression and significantly increase the risk of MI, while cigarette smoking directly damages vascular endothelium and promotes thrombogenesis.[7,8] Although MI is classically considered a disease of older adults, its occurrence in young individuals is increasingly recognized. Acute myocardial infarction in patients younger than 45 years' accounts for approximately 2–8% of all MI cases.[9,10] The etiology in this age group is heterogeneous and includes both atheromatous and non-atheromatous coronary disease. Cigarette smoking and a positive family history are the most frequently reported risk factors among young patients.[11,12] Additional causes include congenital coronary anomalies, hypercoagulable states, oral contraceptive use, and substance misuse such as cocaine or excessive alcohol intake.[13] Given the substantial social, psychological, and economic impact of MI in young adults, understanding its incidence and characteristics remains of major clinical importance. This study aims to assess the incidence of myocardial infarction among young patients admitted to the coronary care unit of Al-Yarmouk Teaching Hospital.

METHOD

This cross-sectional study was conducted at Al-Yarmouk Teaching Hospital, Baghdad, over a ten-month period from April 2010 to January 2011. During the study period, all patients admitted to the coronary care unit (CCU) with a diagnosis of acute myocardial infarction (AMI) were consecutively enrolled, yielding a total sample of 595 patients. **Diagnostic Criteria**: All included patients were diagnosed with AMI according to the World Health Organization (WHO) criteria. Following the 2000 refinement of these criteria, greater emphasis was placed on cardiac biomarkers. Accordingly, myocardial infarction was defined by a rise in cardiac troponin in conjunction with at least one of the following: typical ischemic symptoms, pathological Q waves on electrocardiography, ST-segment elevation or depression, or evidence of coronary intervention.[14]

Study Groups: Patients were stratified into two age-based groups:

- **Group I (young patients):** 60 patients aged 45 years or younger, representing 10% of the study population.
- **Group II (older patients):** 535 patients older than 45 years, accounting for 90% of the study population.

Data Collection: All patients were admitted to the CCU and underwent a standardized assessment. A comprehensive medical history was obtained, including age, sex, chief complaint, and past medical history. Particular emphasis was placed on cardiovascular risk factors such as ischemic heart disease, diabetes mellitus, heart failure, hyperlipidemia, smoking status, family history of coronary artery disease, and history of drug misuse. For patients who were smokers, detailed information regarding the type, amount, and duration of smoking was recorded; all smokers had a smoking history of at least five years. **Clinical Examination and Investigations**: Physical examination included measurement of blood pressure, body weight, height, and waist circumference. All patients underwent electrocardiographic evaluation. Blood samples were collected for biochemical investigations, including cardiac biomarkers, fasting blood sugar, and lipid profile (total cholesterol, triglycerides, high-density lipoprotein cholesterol, and low-density lipoprotein cholesterol). Evaluation for hypercoagulable states—such as measurement of fibrinogen, coagulation factors VII and VIII, protein C, protein S, and antithrombin III—was planned. However, these investigations were not available at the study center during the study period and therefore could not be performed. **Statistical Analysis**: Data were analyzed using appropriate statistical methods. Comparisons between Group I and Group II were performed using the chi-square test. A p-value of less than 0.05 was considered statistically significant.

RESULTS

A total of 595 patients with acute myocardial infarction (AMI) admitted to the coronary care unit at Al-Yarmouk Teaching Hospital were included in the analysis. Of these, 402 patients (67.6%) were males and 193 (32.4%) were females. Patients aged 45 years and below accounted for 60 cases, representing an incidence of 10% of all AMI patients, while 535 patients (90%) were older than 45 years.

Table 1: Gender distribution according to age group: Among patients aged ≤45 years, 54 (90.0%) were males and 6 (10.0%) were females. In contrast, among patients aged >45 years, 348 (65.0%) were males and 187 (35.0%) were females. There was a highly significant association between age group and gender distribution

among AMI patients (p = 0.001), indicating a marked male predominance in younger patients compared with older patients.

Table 2: Comparison of cardiovascular risk factors between age groups: Hypertension was present in 226 patients (38.0%); only 12 patients (20.0%) were aged ≤45 years, whereas 214 patients (40.0%) were aged >45 years. This difference was statistically significant (p = 0.002), demonstrating a higher prevalence of hypertension among older patients. Diabetes mellitus was identified in 160 patients (26.9%): 10 patients (16.7%) in the younger group and 150 patients (28.0%) in the older group, with no statistically significant difference (p = 0.060). A positive family history of coronary artery disease was reported in 116 patients (19.5%), with a significantly higher proportion among younger patients (24 patients, 40.0%) compared with older patients (92 patients, 17.2%) (p = 0.0001). Smoking was highly prevalent, reported in 453 patients (76.1%). Almost all younger patients were smokers (54 patients, 90.0%), compared with 399 patients (74.6%) in the older group, showing a significant association with younger age (p = 0.008).

Dyslipidaemia was present in 215 patients (36.1%), affecting 18 younger patients (30.0%) and 197 older patients (36.8%), with a statistically significant difference between age groups (p = 0.008).

Table 3: Site of infarction according to age group: In the younger age group (≤45 years), anterior myocardial infarction was observed in 41 patients (68.3%), while inferior myocardial infarction occurred in 19 patients (31.7%). Among patients aged >45 years, anterior MI was documented in 351 patients (65.6%) and inferior MI in 184 patients (34.4%). There was no statistically significant difference in infarction site between the two age groups.

Table 4: Presenting symptoms in patients aged >45 years: Typical chest pain was the most frequent presenting symptom, reported in 60.1% of older patients, followed by dyspnea in 29.4%. Atypical presentations—including syncope, giddiness, stroke, or palpitations—were noted in 10.5% of cases. Silent myocardial infarction was uncommon, identified in only six patients and diagnosed incidentally by electrocardiography and cardiac enzyme testing.

Table 5: Comparison of presenting symptoms between age groups: Classical chest pain was the predominant presenting symptom in both groups but was more frequent among younger patients, reported in 51 patients (85.0%) compared with 375 patients (70.1%) in the older group. Atypical symptoms were more common in patients aged >45 years and showed an increasing trend with advancing age, highlighting age-related differences in clinical presentation of AMI.

Table 1: Gender distribution of AMI in the patients studied.

Gender	<45year (n=60)		>45year (n=535)		P value
	No	%	No	%	
Male	54	90.0	348	65.0	0.0001*
Female	6	10.0	187	35.0	

*Significant using Pearson Chi-square test at 0.05 level of significance

Table 2: Risk factors among patients with AMI in both age groups.

	<45year (n=60)		>45year (n=535)		P value
	No	%	No	%	
Hypertension	12	20.7	214	39.9	0.002*
Diabetes mellitus	10	16.7	150	28.0	0.060
Family history	24	40.2	92	17.2	0.0001*
Smoking	54	90.0	399	74.6	0.008*
Dyslipidemia	18	30.0	197	37.3	0.297

*Significant using Pearson Chi-square test at 0.05 level of significance

Table 3: AMI according to the site of the infarction in the two age group.

	<45year (n=60)		>45year (n=535)		P value
	No	%	No	%	
Anterior MI	41	68.3	351	65.7	0.672
Inferior MI	19	29.7	184	34.5	

*Significant using Pearson Chi-square test at 0.05 level of significance

Table 4: The presenting symptoms in both age groups.

Symptoms	<45year (n=60)		>45year (n=535)		P value
	No	%	No	%	
Chest pain	51	85.1	321	60.0	0.0007*
Dyspnea	7	12.9	158	29.5	
Others	2	2.0	56	10.5	

*Significant using Pearson Chi-square test at 0.05 level of significance

Table 5: Presentation of patients with AMI aged>45 year.

Symptoms	Total	
	NO.	%
Chest pain	321	60.1%
Dyspnea	158	29.4%
Syncope	24	4.5%
Palpitation	15	2.9%
Stroke	12	2.2%
Painless	6	0.9%
Total	535	100%

DISCUSSION

The present study compared young patients (≤45 years) admitted with acute myocardial infarction (AMI) to an older cohort, aiming to highlight differences in incidence, presentation, and risk factors. Although AMI is traditionally considered a disease of older age, the increased incidence observed among young adults in recent decades may be partially explained by the rising prevalence of atherosclerotic risk factors in individuals under 45 years of age.[15] In this study, young patients constituted 10% of all AMI admissions, a proportion higher than that reported in some European cohorts, such as the GISSI study from Italy, where young adults represented approximately 2% of cases. This discrepancy may reflect geographic, socioeconomic, lifestyle, and population-based differences, as well as varying exposure to cardiovascular risk factors. Clinical presentation differed notably between age groups. Chest pain remained the most common presenting symptom across all patients; however, its frequency declined with increasing age. Younger patients more often presented with classical ischemic chest pain, whereas older patients exhibited a higher proportion of atypical presentations, including dyspnea, syncope, stroke, and other non-specific symptoms. Although atypical symptoms were less frequent overall (approximately 10%), their prevalence increased with advancing age. These findings are consistent with previous studies demonstrating that elderly patients with AMI are more likely to present without typical chest pain, which may contribute to delayed diagnosis and management.[16,17] Risk factor profiling revealed clear age-related differences. Young patients showed significantly higher rates of cigarette smoking and a positive family history of coronary artery disease (CAD), whereas diabetes mellitus and hypertension were more prevalent among older patients, in agreement with earlier reports.[18,19] Smoking emerged as the most important modifiable risk factor among young patients in the current study, with a statistically significant association ($p = 0.008$). This finding aligns closely with other studies reporting smoking prevalence rates as high as 90–92% among young patients with CAD.[20] Additionally, approximately 40% of young patients in this study reported a first-degree relative with premature atherosclerosis, reinforcing the role of familial and genetic predisposition in early-onset CAD.[21] Diabetes mellitus, although more common in older patients, remains an important contributor to coronary risk in younger populations. Recent epidemiological data indicate an increasing prevalence of metabolic syndrome, insulin resistance, impaired fasting glucose, and impaired glucose tolerance at younger ages.[22,23] Even modest degrees of hyperglycemia have been associated with endothelial dysfunction, enhanced platelet aggregation, and a procoagulant state, mediated through reduced nitric oxide bioavailability and alterations in fibrinogen and coagulation factor activity.[24] Acute hyperglycemia also stimulates inflammatory mediators, cytokines, and adhesion molecules such as ICAM-1, all of which play key roles in the pathogenesis of atherosclerosis.[25] Psychosocial factors may further contribute to the burden of CAD in young adults. Emotional stress, hostility, and aggressive behavioral traits have been linked to subclinical and overt coronary disease. Data from the CARDIA study demonstrated a direct association between hostility scores and coronary artery calcification, suggesting a potential mechanistic link between stress-related factors and atherosclerosis.[26] Acute physical or emotional stress may increase shear forces on coronary plaques, precipitating plaque rupture and subsequent AMI. Young patients with single-vessel disease often benefit markedly from revascularization, whereas those with multivessel disease, diabetes, and hyperlipidemia tend to have poorer long-term outcomes.[27] Radiation-induced coronary artery disease represents another recognized but less common cause of AMI in younger patients. Mediastinal radiotherapy can lead to progressive vascular injury and myocardial ischemia.[28,29] Although no patient in the present study reported therapeutic radiation exposure, incidental or environmental radiation exposure cannot be entirely excluded, particularly in regions affected by prolonged conflict. Overall, epidemiological evidence confirms that cardiovascular risk factors exert additive effects on morbidity and mortality.[50,51] While environmental and lifestyle factors play a major role, genetic susceptibility appears particularly relevant in young patients, potentially influencing multiple pathways involved in atherogenesis.[30] Understanding the interplay between these factors is essential for early prevention strategies and risk reduction in younger populations.

CONCLUSION

The incidence of myocardial infarction in young patients is not an uncommon presentation. In this study the incidence of myocardial infarction in males more than females. Smoking and positive family history are the main risk factors of AMI in young patients.

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