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Impact of Age on Risk Factors and Clinical Manifestations of Acute Coronary Syndrome: An Observation from Coronary Care Unit of Sulaimanyia, Iraq

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Abstract

Background: Acute coronary syndrome has been introduced as a major cause of mortality particularly in the elderly. ST-segment elevation myocardial infarction and non-ST-segment elevation myocardial infarction are two common types of acute coronary syndromes, which have been reported to be associated with some risk factors including age, obesity, hypertension and diabetes that can be utilized to predict and diagnose such disease.

Objectives: The present study was carried out in order to examine the effect of age on risk factors and clinical symptoms of acute coronary syndromes.

Materials and Methods: The present prospective study was carried out on 125 patients with acute coronary syndromes who were admitted at Coronary Care Unit in Sulaimani, the Kurdistan Region of Iraq. Their acute coronary syndromes were diagnosed through clinical presentations, electrocardiography (ECG), and troponin test. Required data were collected from the patients at their admission using a researcher-based checklist, face-to-face interviews, and reference to their medical records. The collected data were analyzed using descriptive statistics and Chi-square test through Statistical Package for the Social Sciences version 20.

Results: The results indicated that the males were the dominant group. Moreover, the age group 45-65 had the highest rate of prevalence of acute coronary syndromes. It was also observed that the most frequent risk factors for acute coronary syndromes were respectively hypertension (54.4%), dyslipidemia (52%), smoking (42.4%), and diabetes mellitus (38.4%). Typical chest pain was found to be the most frequent clinical presentation (88%). The results also demonstrated that there was a significant difference between the age groups in terms of the effect of age on typical and atypical symptoms. However, age had no significant effect on types of acute coronary syndromes. Also, age and typical/atypical symptoms had no significant effect on types of acute coronary syndromes. Finally, family history, hypertension, diabetes mellitus, obesity, smoking, physical inactivity, and dyslipidemia had no effect on types of acute coronary syndromes in the studied age groups.

Conclusion: Age can be a predictive factor for acute coronary syndromes, but the studied risk factors (i.e., family history, hypertension, diabetes mellitus, obesity, smoking, physical inactivity, and dyslipidemia) cannot be used as factors to predict acute coronary syndromes.

Keywords: Acute coronary syndrome; Acute myocardial infarction; typical symptoms; Atypical symptoms; Sulaimanyia, Iraq

Introduction

Cardiovascular diseases (CVD) have been regarded as one of the main causes of mortality in both developing and developed countries [1,2]. The prevalence of cardiovascular diseases has been reported to be increasing at a remarkable pace in both low and middle-income countries [3]. Cardiovascular disease can lead to development of coronary artery disease in which blood flow to the heart is limited, which in turn gives way to development of acute myocardial infarction (AMI) which is shown to be one of the 5 leading mortality causes [4].

Acute coronary syndrome (ACS) includes several coronary artery diseases such as ST-segment elevation myocardial infarction (STEMI), non-ST-segment elevation myocardial infarction (NSTEMI), and unstable angina (UA) [5]. Myocardial infarction is a clinical condition in which the blood flow to myocardium is disturbed, leading to inadequate oxygenation which in turn results in myocardial injury and subsequent infarction [6]. According to the research conducted in Iraq, AMI leads to death in 16.1% of the patients with AMI [7], which is higher than other developing countries such as Iran with 9.4% and Saudi Arabia with 3.0% [8,9].

Research has indicated that there some non-modifiable risk factors for CVD, and thus for ACS, including male sex, a family history of CVD, age over 55 years old, and genetics and some modifiable risk factors such as unhealthy diet, diabetes mellitus (DM), obesity, physical inactivity, systemic arterial hypertension, smoking, and dyslipidemia (DLP) [10-12]. Among the abovementioned risk factors, old age has

been regarded as a potent predictor of mortality in patients with acute myocardial infarction [13-15]. ACS is associated with typical and atypical symptoms. Typical symptoms of ACS include jaw/neck pain, sweating, shortness of breath, arm pain, and chest pain, and its atypical symptoms are mid-back pain, vomiting, palpitation, weakness, and fainting [16,17].

There are quite many research studies focusing on the correlation between ACS and risk factors like smoking, dyslipidaemia, and hypertension [18-20]. However, the relationship between age and atypical and typical symptoms of acute coronary syndrome has hardly been studied [21,22]. In this regard and to fill this research gap, the present study was aimed at investigating the influence of age on presentation of ACS and examining whether the risk factors of ACS change according to age or not.

Materials and Methods

In a prospective study which was carried out over a period of 8 months from August 2018 to March 2019, 125 patients who were diagnosed with acute myocardial infarction (both STEMI and NSTEMI). The patients were selected randomly from among all the AMI patients who were admitted to Coronary Care Unit in Sulaimani, the Kurdistan Region of Iraq. For diagnosis of AMI, clinical presentations, electrocardiography (ECG) and troponin test were utilized.

The study samples were chosen from among both sexes based on the study inclusion criterion, i.e., all patients who had acute myocardial infarction and had undergone treatment. The exclusion criteria were patients with a history pulmonary embolism, pneumonia, congestive occlusive pulmonary disease, heart failure, and cerebrovascular accident. Similar to the studies carried out by Conto et al., Ricci et al. and Geifman and Rubin [23-25], the selected patients were divided into 3 age groups namely young group (<45 years), middle-age group (45-65 years), and old group (>65).

Required data were collected using a researcher-designed checklist that was aimed at gathering data on the patients' typical and atypical symptoms of ACS at the time of their admission to the Coronary Care Unit. For the purpose of classifying the typical and atypical symptoms, the classification proposed by Milner et al. was utilized [26]. Data collection was carried out and face-to-face interviews were performed with the patients in order to record the ACS symptoms in the checklist. Moreover, the patients' current records were used to collect other required data including demographics like age and sex and risk factors such as obesity (BMI ≥ 30, smoking, diabetes, hypertension, and so on.

The collected data were analyzed using SPSS version 20. For this purpose, the categorical data were analyzed through descriptive statistics, and the results were expressed as numbers (frequency) and percentages. Moreover, Chi-square test was utilized in order to see the significance of the effect of age on different risk factors of ACS. The p value of <0.05 was considered as the significant level for all statistical tests.

In order to take the ethical considerations into account, necessary approval was obtained from the Ethics and Scientific Committee of College of Medicine, University of Sulaimani. Moreover, written informed consent was obtained from all the patients after they were provided with necessary explanations about the aims, method, and duration of the study.

Results

In a prospective study, 125 patients who were diagnosed with acute myocardial infarction were recruited in order to examine the effect of age on ACS presentation and whether it leads to changes in the risk factors of ACS. The results of the present study regarding the patients' demographic characteristics revealed that nearly half of patients (41.6%) belonged to the age group 45-65 years, 36.8% aged over 65, and 21.6% were under 45 years old. Regarding the patients' age, it was observed that most of the patients (67.2%) were males and 32.8% were women (Table 1).

Characteristics of patients	Frequency (N)	Percentage (%)
Age		
<45 Young	27	21.6
45-65 Middle age	52	41.6
> 65 Old age	46	36.8
Total	125	100
Gender		
Female	41	32.8
Male	84	67.2
Total	125	100

Table 1: The demographic characteristics of the patients.

Risk factors	Frequency (N)		Percentage (%)
	Positive	Negative	
FMH	18	107	14.4 85.6
HTN	68	57	54.4 45.6
DM	48	77	38.4 61.6
Obesity	30	95	24 76
Smoking	53	72	42.4 57.6
Physical inactivity	4	121	3.2 96.8
Dyslipidemia	65	60	52 48

Table 2: Shows the frequency of risk factors in the patients.

Regarding the observed risk factors of AMI, the results demonstrated that the most frequent risk factors were hypertension (HTN) in 68 patients (54.4%), dyslipidemia in 65 patients (52%), smoking in 53 cases (42.4%), and diabetes mellitus (DM) in 48 patients (38.4%). Other risk factors were obesity, family history (FMH), and physical inactivity in 30 (24%), 18 (14.4%), and 4 patients (3.2%), respectively (Table 2). The results of the present study also showed that all the patients with AMI had either typical or atypical chest pain with respectively 88% and 12% (Table 3).

Symptoms		Frequency (N)	Percentage (%)
Chest pain	Typical	110	88
	Atypical	15	12
Total		125	100

Table 3: Types of chest pain in the patients.

As revealed by the results, the number of the patients with STEMI and non-STEMI types of AMI was equal, such that 504% of them had STEMI and 49.6% had non-STEMI (Table 4).

ACS	Frequency (N)	Percentage (%)
STEMI	63	50.4
NSTEMI	62	49.6
Total	125	100

Table 4: Types of myocardial infarction in the patients.

Regarding the distribution of typical and atypical symptoms of AMI, the results indicated that there was a significant difference between the age groups, namely young (<45), middle age (45-65), and old age (>65), in terms of their typical and atypical symptoms of AMI at p=0.03 (Table 5). Therefore, age can be considered as a predictive factor for types of ACS symptoms.

Age group	Symptoms		Total N (%)	p-value
	Typical N (%)	Atypical N (%)		
< 45 Young	25 (92.6)	2 (7.4)	27 (100.0)	0.03
45-65 Middle age	49 (94.2)	3 (5.8)	52 (100.0)	
> 65 Old age	36 (78.3)	10 (21.7)	46 (100.0)	
Total	110 (88.0)	15 (12)	125 (100.0)	

Table 5: Distribution of symptoms according to age.

However, the results showed that the three age groups were not significantly different in terms of the type of their ACS (p=0.06); therefore, the patients' age cannot be considered as a predictive factor for the type of ACS or myocardial infarction (MI) (Table 6).

Age group	ACS		Total N (%)	p-value
	STEMI N (%)	NSTEMI N (%)		
< 45 Young	12 (63.0)	10 (37.0)	27 (100.0)	0.06
45 -65 Middle age	29 (55.8)	23 (44.2)	52 (100.0)	
> 65 Old age	17 (37.0)	29 (63.0)	46 (100.0)	
Total	63 (50.4)	62 (49.6)	125 (100.0)	

Table 6: Distribution of ASC in different age groups.

With regard to the collective effect of age and typical/atypical symptoms on ACS types (STEMI and NSTEMI), the results of the present study revealed that age and typical/atypical symptoms did not have a significant effect on ACS in any of the age groups (Table 7).

Age	Symptoms	ACS		Total	p-value
		STEMI	NSTEMI		
< 45 Young	Typical	15 (60.0)	10 (40.0)	25 (100.0)	0.26
	Atypical	2 (100.0)	0 (0.0)	2(100.0)	
	Total	17 (63.0)	10 (37.0)	27 (100.0)	
45-65 Middle age	Typical	27 (55.1)	22 (44.9)	49 (100.0)	0.695
	Atypical	2 (66.7)	1 (33.3)	3 (100.0)	
	Total	29 (55.8)	23 (44.2)	52 (100.0)	
> 65 Old age	Typical	15 (41.7)	21 (58.3)	36 (100.0)	0.209
	Atypical	2 (20.0)	8 (80.0)	10 (100.0)	
	Total	17 (37.0)	29 (63.0)	46 (100.0)	
Total	Typical	57 (51.8)	53 (48.2)	110 (100.0)	0.39
	Atypical	6 (40.0)	9 (60.0)	15 (100.0)	
	Total	63 (50.4)	62 (49.6)	125 (100.0)	

Table 7: The collective effect of age and symptoms on ACS.

Finally, the results of the present study demonstrated that none of the studied risk factors (i.e., family history, hypertension, diabetes mellitus, obesity, smoking, physical inactivity, and dyslipidemia) had a significant effect on ACS in any of the age groups (p>0.05) (Table 8).

Risk factors	Age groups	ACS		Total	p value
		STEMI No. (%)	NSTEMI No. (%)		
Family history	< 45 Young	5 (55.6)	4 (44.4)	9 (100.0)	0.5
	45 -65 Middle age	3 (42.9)	4 957.1)	7 (100.0)	0.4

	> 65 Old age	1 (50.0)	1 (50.0)	2 (100.0)	0.6
	Total	9 (50.0)	9 (50.0)	18 (100.0)	0.9
Hypertension	< 45 Young	3 (100.0)	0 (0.0)	3 (100.0)	0.159
	45 -65 Middle age	13 (46.4)	15 (53.6)	28 (100.0)	0.143
	> 65 Old age	14 (37.8)	23 (62.2)	37 (100.0)	0.802
	Total	30 (44.1)	38 (55.9)	68 (100.0)	0.125
Diabetes Mellitus	< 45 Young	5 (62.5)	3 (37.5)	8 (100.0)	0.974
	45 -65 Middle age	8 (47.1)	9 (52.9)	17 (100.0)	0.378
	> 65 Old age	8 (34.8)	15 (65.2)	23 (100.0)	0.76
	Total	21 (43.8)	27 (56.3)	48 (100.0)	0.24
Obesity	< 45 Young	3 (60.0)	2 (40.0)	5 (100.0)	0.879
	45 -65 Middle age	5 (41.7)	7 (58.3)	12 (100.0)	0.262
	> 65 Old age	6 (46.2)	7 (53.8)	13 (100.0)	0.417
	Total	14 (46.7)	16 (53.3)	30 (100.0)	0.639
Smoking	< 45 Young	11 (73.3)	4 (26.7)	15 (100.0)	0.212
	45 -65 Middle age	14 (56.0)	11 (44.0)	25 (100.0)	0.974
	> 65 Old age	7 (53.80	6 (46.2)	13 (100.0)	0.136
	Total	32 (60.4)	21 (39.6)	53 (100.0)	0.056
Physical inactivity	< 45 Young	1 (100.0)	0 (0.0)	1 (100.0)	1
	45 -65 Middle age	1 (100.0)	0 (0.0)	1 (100.0)	0.369
	> 65 Old age	1 (33.3)	2 (66.7)	3 (100.0)	0.893
	Total	2 (50.0)	2 (50.0)	4 (100.0)	0.987
Dyslipidemia	< 45 Young	8 (57.1)	6 (42.9)	14 (100.0)	0.516
	45 -65 Middle age	16 (61.5)	10 (38.5)	26 (100.0)	0.402
	> 65 Old age	10 (40.0)	15 (60.0)	25 (100.0)	0.641
	Total	34 (52.3)	31 (47.7)	65 (100.0)	0.657

Table 8: The effect of age and the risk factors on ACS.

Discussion

Of the recruited 125 patients with AMI, most of them (41.6%) were between 45 and 65 years old, followed by 46 patients (36.8%) over the age of 65 and 27 (21.6%) under the age of 45. This result clearly indicates that acute myocardial infarction is more prevalent among middle-aged group (45-65 years old). Similar findings have been reported in previously conducted studied [23,24,27]. The results also revealed that AMI was more prevalent among male patients with 67.2%, while a smaller percentage of the women (32.8) had AMI. This finding in good agreement with previous research studies that referred to male sex as a risk factor for acute coronary syndrome [26,28-30].

Hypertension was found to be the most frequent risk factor among the studied AMI patients, such that 65 cases (54.4%) had hypertension. Other most frequent risk factors were observed to be dyslipidemia (52%), smoking (42.4%), diabetes mellitus (38.4%), obesity (24%), family history (14.4%), and physical inactivity (3.2%). Similar to the present study, in their study conducted in Sulaimania, Iraq, Mirza et al. who studied risk factors for ACS among patients who were under the age of 40 concluded that obesity, smoking, number of diseases vessels, hypertension, family history of ACS, and diabetes mellitus were respectively the most frequent risk factors for ACS [30]. This finding is consistent with many other previously conducted studies that referred to smoking, hypertension, diabetes, obesity, and dyslipidemia and risk factors for development of ACS [31-34].

Chest pain has been introduced as the most common presentation of acute coronary syndrome, such that it has been reported that 20 to 25% of the patients who refer to emergency department are later found to have ACS [34]. Similarly, the results of the present study

demonstrated that most of the patients with AMI (88%) had typical chest pain and the rest 12% had atypical chest pain, which is approximate with the results of the study conducted by El-Menyar et al. [35].

Regarding the types of acute myocardial infarction, the results indicated that the number of the patients with STEMI was almost equal to those with NSTEMI, such that 50.4% had the former and 49.6% had the latter. However, based on a report by the American Heart Disease Association Statistics Committee and Stroke Statistics Subcommittee, two-thirds of the patients had NSTEMI, and the rest had STEMI [36]. On the contrary, in their study carried out on 2090 patients with ACS, Montalescot et al. reported that a larger number of the patients had STEMI [37]. These can happen because of the sampling methods and procedures differences.

The results of the present study indicated that the studied 3 age groups were significantly different in terms of distribution of typical and atypical symptoms at p=0.03, such that typical symptoms were more prevalent in the patients under the age of 65 (i.e. those in the <45 and 45-65 age groups), while the old age group (over 65) had more atypical presentations. This finding is in good agreement with those of the study carried out by El-Menyar et al. who observed that older patients with ACS usually develop atypical symptoms [35].

As revealed by the results of the present study, the three age groups were different regarding the distribution of types of ACS (i.e., STEMI and NSTEMI). However, this difference was not significant. This finding in not in line with the results of the study carried out by Pour et al. who concluded that the two age groups that they studied (older patients with an average age of 71.32 and younger patients with a mean age of 53.75) were significantly different in terms of the ACS type (p<0.01) [38]. This difference can be attributed to the difference between that study and the present one regarding the classification of the age groups. Moreover, in the study by Pour et al. in addition to STEMI and NSTEMI, unstable angina was also considered, which can have a significant effect on the discrepancy between the results of the two studies in this regard. Reda et al. also concluded that there was a significant difference between the age groups regarding ACS types [39]; however, similar to Pour et al. they studied three types of ACS (i.e., STEMI, NSTEMI, and unstable angina), which can be responsible for the observed difference between those studies and the present one.

Regarding the effect of the studied risk factors (i.e., family history, hypertension, diabetes mellitus, obesity, smoking, physical inactivity, and dyslipidemia), it was concluded that none of the risk factors had a significant effect on development of ACS in the studied age groups (p>0.05). However, in the present study, different age groups were not compared against each other. In other words, intergroup comparison was not carried out. As opposed to the present study, in their study, Pour et al. compared an older group with ACS with a younger one and concluded that the two groups were significantly different regarding smoking (p=0.002), obesity (p=0.019), and hypertension (p=0.002) [38]. However, similar to the results of the present study, Reda et al. concluded that obesity and hypertension did not have a significant effect on development of ACS [39]. The differences between the studies can be attributed to differences between the studies regarding their age grouping, number of patients, and other uncontrollable variables. The present study had some limitations. The first limitation was the limited number of the patients, which can restrict the generalizability of the results to other populations. Another limitation was that different age groups were not compared (intergroup comparison) regarding the effect of the studied risk factors of development of their ACS. Therefore, future studied is recommended to recruit a larger study sample and compared different age groups regarding the risk factors proposed by the relevant literature.

Conclusion

The results of the present study indicated that male patients aged 45 to 65 had the highest rate of prevalence of acute myocardial infarction (acute coronary syndrome). Moreover, hypertension, smoking, and diabetes were found as the most frequent risk factors for ACS. Therefore, patients with these risk factors need to be provided with diagnostic examination to make sure about the presence or absence of ACS. Typical chest pain was found as the most common clinical presentation of ACS. However, atypical chest pain was more frequent among older patients. The results indicated that different age groups are significantly different regarding typical and atypical symptoms of ACS. Therefore, age can be used as a factor to predict the type of ACS presentations. However, the results revealed that age cannot be considered as a predictive factor for type of ACS (i.e., STEMI and NSTEMI). Also, it was found that STEMI and NSTEMI could not be predicted through typical and atypical symptoms. Finally, the results demonstrated that none of the studied risk factors (i.e., family history, hypertension, diabetes mellitus, obesity, smoking, physical inactivity, and dyslipidemia) had a significant effect on development of ACS in the studied age groups.

Conflicts of Interest

There are no conflicts of interest for the present study.

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