Relation between Metabolic syndrome and acute coronary syndrome and arrhythmia in AL-Nasiriya city/Iraq
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ABSTRACT

Objective: To determine the relation between metabolic syndrome and acute coronary syndrome and arrhythmia.

Place and duration of the study: Coronary care unit in AL-Hussein teaching hospital from 2014-2015.

Methods: A 60 patients with acute coronary syndrome and (or) arrhythmias were included in this study. Demographic data (age and sex) and the 5 component conditions of the metabolic syndrome were assessed. Fasting blood samples were drawn for blood glucose and lipid profile within the first 24 hours of the admission. Systolic and diastolic blood pressure were assessed and all patients were physically assessed for waist circumferences. Echocardiography was done to all patients.

Results: In this study population, 32 (54%) patients were male and 28 (46%) were female with mean age of 56 ± 17.4 years in men and 52 ± 16.8 years in women. The prevalence of metabolic syndrome was higher in females, in 18 (30%) than males 17 (28%). The highest rate of metabolic syndrome was in patients diagnosed as ST-segment elevation myocardial infarction (STEMI). Atrial fibrillation (AF) was the commonest arrhythmia found in patients with metabolic syndrome.

العلاقة بين متلازمة الامراض الاستقلابية ومتلازمة الشريان التاجي الحادة وعدم انتظام ضربات القلب في مدينة الناصرية / العراق

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الخلاصة

الهدف: لتوضيح العلاقة بين متلازمة الامراض الاستقلابية ومتلازمة الشريان التاجي الحادة وعدم انتظام ضربات القلب قي مدينة الناصرية / العراق.

مكان وفترة الدراسة: وحدة إنعاش القلب في مستشفى الحسين التعليمي للفترة من 2014-2015.

طرائق الدراسة: تمت الدراسة على 60 مريضا (32 مريضا ذكرا و28 مريضة انثى) في وحدة إنعاش القلب في مستشفى الحسين التعليمي وتم تشخيص متلازمة الشريان التاجي الحاد بأنواعه وتشخيص حالات عدم انتظام ضربات القلب لدى المرضى. تم اخذ العمر والجنس لكل المرضى وتم سحب عينات الدم في حالة الصيام من المرضى لقياس تحليل مستوى السكر وتحليل صورة الدهون الكيميائية الكلية خلال ال 24 ساعة الأولى لدخول المرضى في وحدة إنعاش القلب. كذلك تم قياس ضغط الدم الانبساطي والانقباضي مع قياس محيط الخصر لكل المرضى.

النتائج: تمت الدراسة على 32 (54 %) مريضا ذكرا و28 (46 %) مريضة انثى، وكان معدل العمر 56 ± 17.4 سنة عند الذكور و52 ± 16.8 سنة عند الاناث.

أظهرت الدراسة ان معدل انتشار متلازمة الامراض الاستقلابية عند المريضات الاناث اعلى منه عند المرضى الذكور بنسبة 30 % عند الاناث و28 % عند الذكور. كما أظهرت الدراسة ان نسبة انتشار متلازمة الامراض الاستقلابية كانت الأعلى عند احتشاء العضلة القلبية مع ارتفاع مقطع ST. الرجفان الاذيني كان الأكثر نوعا من حالات عدم انتظام ضربات القلب عند مرضى متلازمة الامراض الاستقلابية.

INTRODUCTION

Metabolic syndrome (MS) represents a cluster of cardiovascular (CV) and metabolic derangements (ie, increased blood pressure, abdominal obesity, insulin resistance, and dyslipidemia), which deteriorate vascular function and cause subclinical damage in a variety of organs, more than

traditional risk factors individually (1). There are several definitions of MS, but the key features are abdominal obesity, elevated blood pressure, dyslipidemia (high triglycerides (TG) and high-density lipoprotein-cholesterol (HDL-C), and glucose intolerance. The most widely accepted definitions are those who have been proposed by National Cholesterol Education Program-Third Adult Treatment Panel (NCEP ATP III) (2), the American heart Association (AHA)/National Heart, Lung, and Blood Institute (NHLBI) (3), and the International Diabetes Federation (IDF) (4). The American Heart Association / National heart, Lung, and Blood Institute 2005 scientific statements define the metabolic syndrome as the presence of at least three of the following criteria:

- Waist circumference greater than or equal to 40 inches (102 cm) in men or 35 inches (88 cm) in women

- Triglycerides greater than or equal to 150 mg/dl (1.7 mmol/L) or on drug treatment for elevated triglycerides

- High density lipoprotein (HDL) cholesterol less than 40 mg/dL (1.03 mmol/L) in men or 50 mg/dL (1.3 mmol/L) in women or on drug treatment for reduced HDL

- Systolic blood pressure greater than or equal to 130 mmHg or diastolic blood pressure greater than or equal to 85 mmHg or on antihypertensive drug treatment in a patient with a history of hypertension

- Fasting glucose greater than or equal to 100 mg/dL or on drug treatment for elevated glucose

The global prevalence of MS is high-between 20% and 25% and varies according to the diagnostic criteria used (5,6). Regardless of the diagnostic

criteria used, its prevalence is high in individuals with cardiovascular diseases (CVDs) (7). MS is considered a risk factor as important as smoking habit for the development of occlusive vascular diseases and atherosclerotic diseases (1,6,8). Therefore, the diagnosis and treatment of MS are extremely important because its prevalence is increasing worldwide.

The MS is associated with CVD through factors such as centripetal obesity, visceral fat, hypertension, dyslipidemia, small dense LDL and high levels of plasminogen activator inhibitor (PAI-1) (9,10), and the association increases cardiovascular mortality by a factor of approximately 2.5 (11,12).

Coronary artery disease (CAD) is one of the leading causes of both morbidity and mortality in the industrialized world. Recent studies indicated that environmental exposures, lifestyle factors, genetic determinants and inflammatory processes play an important role in the pathogenesis of CAD (13,14).

PATIENTS, MATERIALS AND METHODS

A total of 60 participants who were admitted in the coronary care unit in AL-Hussein teaching hospital between 2014-2015 were included in this study. Their age ranged from 20-70 years. All participants had complete data including detailed history and physical examination including examination of the waist circumference that was measured with a tape measure mid-way between the lower rib margin and the iliac crest.

Arterial blood pressure (ABP) was measured according to the recommendations correct ABP measurement based on the guidelines for the European society of hypertension, 2007 (15). Blood pressure was recorded with the same mercury manometer in the sitting position after 10-15 minutes rest. Each patient had two measurements of blood pressure at five minutes interval.

Venous blood samples were drawn in the first 24 hour after admission and in the morning after an overnight fast for plasma glucose, triglyceride (TG) and high density lipoprotein (HDL) cholesterol. Laboratory techniques for biochemical analysis were glucose oxides for blood glucose, and the enzymatic method for triglyceride and HDL cholesterol (16,17). Echocardiography was performed to all patients to exclude any structural heart diseases.

Patients with stroke, chronic kidney disease, chronic obstructive pulmonary disease and valvular heart disease were excluded from the study. All patients were assessed for the five components and criteria of the metabolic syndrome.

Coronary artery disease was determined according to the following:

1) Documented history of myocardial infarction (MI) and (or) ischemic changes on electrocardiogram (ECG) coded by the Minnesota codes (MC) 1-1 or 1-2 (18).

2) Angina pectoris was defined by G. Rose questionnaire (without MI and (or) MC 1-1 or 1-2 (19).

3) Positive troponin I concentration in symptomatic patients (20).

Arrhythmias were diagnosed from the 12-leads ECG recorded. The diagnosis of MS was performed according to the American Heart Association / National heart, Lung, and Blood Institute 2005 scientific statements criteria (3). Differences between groups were tested statistically using the Chi square test for categorical and T test for numerical variables. Data were considered statistically significant when the P value was ≤ 0.05.

RESULT

The study included 60 patients with documented diagnosis of ischemic heart disease and (or) arrhythmias, 32 (54%) were male and 28 (46%) were female as show in figure (1).
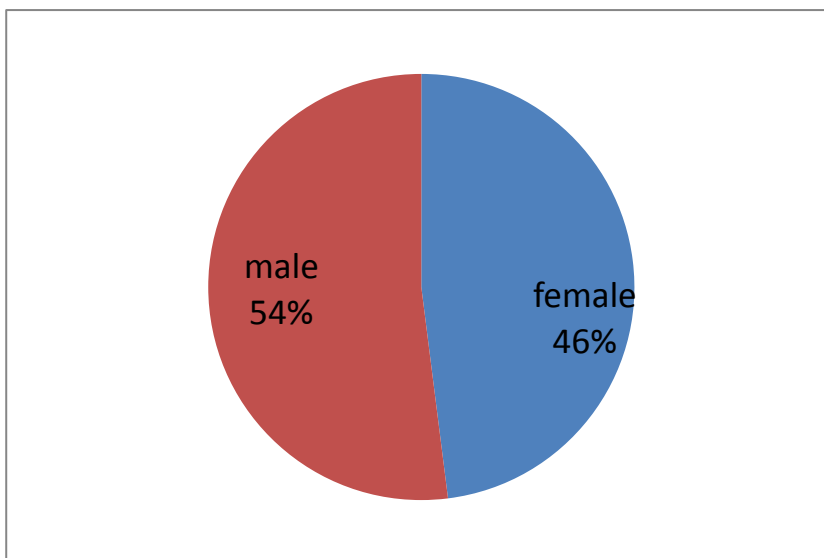

Figure (1): Percentage of both sexes included in this study

Table (1) show the distribution of the physical and metabolic characteristics in both male and female in this study and show significant differences were found between males and females in the fasting blood sugar and plasma triglyceride and waist circumference.

Table (1): Physical and metabolic characteristics of the patients studied

Variables	Male	Female	P value
Age (mean ± SD)	56 ± 17.4	52 ± 16.8	NS
FBS (mg/dL)	126 ± 56	150 ± 80.6	0.001
SBP (mmHg)	135 ± 16.2	140 ± 16.5	NS
DBP (mmHg)	78 ± 10.5	76 ± 10.7	NS

TG (mg/dL)	230 ± 62.3	265 ± 70.9	0.001
HDL (mg/dL)	45 ± 8	37 ± 5.5	NS
WC (cm)	112 ± 11.6	120 ± 14	0.001

FBS: fasting blood sugar, SBP: systolic blood pressure, DBP: diastolic blood pressure, TG: triglyceride, HDL: high density lipoprotein cholesterol, WC: waist circumference

Table (2) show the frequency of different criteria of the metabolic syndrome, and appear that the most common criteria was FBS in 34 (56.6%) patients, TG in 34 (56.6%) patients and waist circumference in 32 (53%) patients.

Table (2): Frequency of variables of metabolic syndrome

Variables	Number of patients have (out of 60)
SBP $\geq$ 140 mmHg	10 (16.6%)
DBP $\geq$ 90 mmHg	12 (20%)
FBS $\geq$ 110 mg/dL	34 (56.6%)
TG $\geq$ 150 mg/dL	34 (56.6%)
HDL $\leq$ 40 mg/dL	22 (36.6%)
WC	32 (53%)

Table (3) show the number of conditions with ischemic heart disease and arrhythmia in both male and female patients studied, and show high number of patients were found to have STEMI regarding the ischemic heart disease and high number of patients were found to have AF regarding the arrhythmia.

Table (3): Number of patients with IHD and Arrhythmias of the study population

Condition	Male (n = 32)	Female (n= 28)
STEMI	17	10
Non-STEMI	5	7
ST – T changes	2	5
AF	6	3
SVT	1	3
VT	1	o

STEMI: ST segment elevation myocardial infarction, Non-STEMI: non ST segment elevation myocardial infarction, AF: atrial fibrillation, SVT: supraventricular tachycardia, VT: ventricular tachycardia

Table (4) show the number and percentage of patients with metabolic syndrome in all patients studied, and the table show 17 (28%) male patients and 18 (30%) female patients were found to have metabolic syndrome.

Table (4): Number and percentage of metabolic syndrome of the study population by gender

	Male (n:32)	Female (n:28)	Total (n:60)
MS	17 (28%)	18 (30%)	35 (58%)
Non-MS	15 (24%)	10 (18%)	25 (42%)
Total	32	28	60

MS: metabolic syndrome, Non-MS: Non-metabolic syndrome

Table (5) show the number and percentage of patients with metabolic syndrome in different types of ischemic heart disease and arrhythmias, this table show high percentage of patients with metabolic syndrome were found to have STEMI { 9 (15%) were male and 8 (13.5%) were female}. Atrial fibrillation was the commonest arrhythmia associated with metabolic syndrome especially in male patients.

Table (5): Number and percentage of metabolic syndrome in IHD and arrhythmia of the study population by gender

CONDITION	MALE (n: 17)	FEMALE (n: 18)
STEMI	9 (15%)	8 (13.5%)
Non-STEMI	3 (5%)	5 (8%)
ST- T changes	1 (1.6%)	3 (5%)
AF	4 (6.6%)	1 (1.6%)
SVT	0	1 (1.6%)
VT	0	0

DISCUSSION

This study shows significant gender difference in FBS, plasma TG and WC. Rancho Bernardo study and Whitehall study found significant associations between blood glucose and WC with the prevalence of Ischemic ECG (21,22). Vijay Achari study was found that the mean TG was statistically significant among patients studied which support the finding of

the present study (23). The high TG level in this study may be due to lifestyle and dietary habit of the study sample. The study also show, as in table (2), high number and percentage of patients were found to have FBS, TG and WC than other components of metabolic syndrome and this correlate with Ulf Lindblad, et al. study, was found high percentage of FBS, TG and WC in the studied population (24).

In our study, the percentage of the metabolic syndrome in females at 30% was greater than in males at 28%. This finding of a higher percentage of the metabolic syndrome in females is consistent with other studies. Marchesini et al reported a prevalence of 56.7% in females, compared to 51.9% in males (25). Similarly, Lee et al found a higher prevalence in their female subjects at 31.9%, compared with 20.5% in males, but found that males were significantly associated with an increased risk of having the metabolic syndrome (26).

In this study the prevalence of IHD especially STEMI was higher in both male and female patients with metabolic syndrome (15% and 13.5% respectively). Iraj Nabipour et al, found that there was a high prevalence and association between MS and resting ECG evidence of IHD (27). Three meta-analysis found that the MS increases the risk for incident coronary artery disease (CAD) (28,29).

Another study, Chung et al, reported that MS is highly prevalent in patients aged < 45 years presenting with ACS; however, the incidence of STEMI was not significantly different in patients with and those without MS (30).

Atrial fibrillation was the commonest arrhythmia associated with metabolic syndrome especially in male patients {4 (6.6%)}. Altieri et al

demonstrated a high incidence of AF (16%) in a population of Hispanic patients with metabolic syndrome (31).

The authors suggested mechanisms of this association might include sinus node remodeling, atrial fibrosis, and older age, which are all seen in a population with metabolic syndrome. Another possible mechanism by which the metabolic syndrome may predispose to AF is mechanical stress in the atrium. Structural remodeling and electrophysiological remodeling are critical for AF to perpetuate (32,33).

CONCLUSION

Metabolic syndrome, a constellation of associated conditions. It has been recognized as a risk factor for cardiovascular morbidity and mortality. Among patients with ischemic heart disease, the frequency of metabolic syndrome was high, particularly in females. Majority of patients had high fasting blood sugar, triglycerides and waist circumference. It has been recognized that atrial fibrillation may be associated with metabolic syndrome.

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