Frequency of Metabolic Syndrome in a Sample of Adult Diabetics in Baghdad

Faisal Gh. Al-Rubaye
PhD

Abstract

Background: The metabolic syndrome (MS) which is characterized by risk of developing diabetes mellitus and cardiovascular disease (CVD) is becoming an increasingly recognized disorder with an age- adjusted prevalence of 23.7%. In Iraq, there is little data concerning metabolic syndrome hence this study come to add some information about MS and to find the frequency of metabolic syndrome among Iraqi sample of patients with type 2 diabetes attending National Diabetes Centre of Al-Mustansiriya University.

Method: This is a cross sectional study on 400 cases of diabetes mellitus who attended the National Diabetic centre/ Al-Mustansiriya university for a period of 6 months. All cases were examined by a consultant physician. All the patients were interviewed and blood pressure is examined، BMI was calculated and lipid profile measuring TG and HDL was done.

Results: The prevalence of MS among diabetics in this study was 38.7%. The main factor of metabolic syndrome was diabetes followed by hypertension, obesity and dyslipidemia. Females in this study were more prone to have metabolic syndrome; male: female ratio 1:2. Those in the age group 60-69 had the highest frequency of metabolic syndrome. Those with BMI 30-40 had the highest frequency of metabolic syndrome.

Conclusion: This study concludes that early diagnosis and aggressive treatment is needed for metabolic syndrome to avoid cardiovascular complications.

Key word: *DM, metabolic syndrome.*

Introduction

The metabolic syndrome (MS) which is characterized by risk of developing diabetes mellitus and cardiovascular disease (CVD) is becoming an increasingly recognized disorder with an age- adjusted prevalence of 23.7%. Using 2000 census data, it is estimated that about 47 million U.S. residents have the metabolic syndrome [1].

The metabolic syndrome is a cluster of the most dangerous heart attack risk factors: diabetes and prediabetes, abdominal obesity, high cholesterol and high blood pressure. It is estimated that around a quarter of the world's adult population have metabolic syndrome and they are twice as likely to die from and three times as likely to have a heart attack or stroke compared with people without the syndrome. In addition, people with metabolic syndrome have a fivefold greater risk of developing type 2 diabetes[2].

Diabetes mellitus is a chronic health problem affecting more than 17 million people in the United States. Approximately 11 million of these people have been diagnosed, leaving about 6 million undiagnosed.

There are 800,000 new cases of diabetes per year; almost all of these are type 2 diabetes. Diabetes is a significant risk factor in coronary heart disease and stroke, and it is the leading cause of blindness and end-stage renal disease, as well as a major contributor to lower extremity amputations [3].

Each year, 3.2 million people around the world die from complications associated with diabetes. In countries with a high diabetes incidence, such as those in the Pacific and the Middle East, as many as one in four deaths in adults aged between 35 and 64 years is due to the disease.

Type 2 diabetes, which accounts for 90 per cent of all diabetes, has become one of the major causes of premature illness and death, mainly through the increased risk of CVD which is responsible for up to 80 per cent of these deaths [4].

These cardiovascular complications of diabetes, which is also a leading cause of blindness, amputation and kidney failure, account for much of the social and financial burden of the disease [5].

The prediction that diabetes incidence will double by 2025 heralds a parallel rise in cardiovascular-related illness and death with an inevitable and profound impact on global healthcare systems. However, even before levels of blood glucose are high enough for a person to be diagnosed with diabetes, hyperglycemia and related changes in blood lipids (increase in triglycerides and decrease in the good cholesterol HDL-C) increase a person's risk of cardiovascular disease. The clustering of CVD risk factors that typify the metabolic syndrome are now considered to be the driving force for a CVD epidemic [5].

In Iraq, there is little data concerning metabolic syndrome hence this study come to add some information about MS, aimed to find the frequency of metabolic syndrome among Iraqi sample of patients with type 2 diabetes attending National Diabetes Centre of Al-Mustansiriya Medical College and also to study some epidemiological factors related to Metabolic Syndrome such as age, sex, occupation, and family history of diabetes.

Patients & Methods

This study was carried out within a period of six months (from 15th November 2006 to 15th April 2007), in the National Diabetic Center of Al - Mustansiriya University in Baghdad which was established in 1997.

The design of this study is a cross-sectional of analytic purpose. The cross-sectional study is ideal in calculating prevalence.

A convenient sample of 400 diabetic patients who had type-2 diabetes was enrolled in this study.

The following inclusion criteria were used:

1- Adults (≥ 20 years)
2-Only type 2 diabetes.

In this work Diagnosis of MS is done using new definition which is a modified version of national Cholesterol Education program (NCEP) definition. Using BMI instead of waist circumference; this is in agreement with [6].

In this modified definition which is used in this work, MS can be diagnosed if least three of five following criteria are present:

1. Glucose > 110mg/dl since all our patients who were studied in this work were diabetics, they fulfill this criterion.
2. BMI equal or more than 30kg/m2
3. TG equal or more than 150mg/dl
4. HDL < 40mg/dl in males; < 50mg/dl in females
5. BP equals or more than 130/85mm Hg

Using this modified definition has the advantage of predicting an increased risk of CHD and new-onset diabetes. The new definition, therefore, appears useful in identifying people who could benefit from lifestyle changes to prevent these diseases.

Each patient was subjected to a special form of questionnaire by direct interview. Examination included:

1-Blood pressure (systolic and diastolic) by using new mercury instrument.
2-Height and weight.

Body mass index (BMI) was calculated according to the following equation.

BMI= [weight (kg)/height (m)2]

Investigations: - include Triglycerides and HDL-C. Ten milliliters of venous blood were drawn from each patient after 12 hours fast. Samples were transferred into clean plane tube, left at room temperature for 15 minutes for clotting, centrifuged, and then serum was separated for measuring for TG, and HDL-C. The tubes were stored at 4^{o} C for no longer than seven days. Serum TG was measured by triglyceride kit PAP 150 (Biomerieux, France), using the enzymatic method. Serum HDL-C was measured by HDL kit PAP 150 (Biomerieux, France), using the enzymatic method based on the following: The Chylomicrons and lipoproteins of VLDL and LDL contained in the sample were precipitated by the addition of phosphotungestic acid in the presence of magnesium ions.

The supernatant obtained after centrifugation contained HDL from which the cholesterol could be determined using the cholesterol enzyme reagents [7].

Statistical analysis was done using SPSS version 10.5 computer software (statistical package for social sciences). Frequency distributions for selected variables were done first. While chi-square was used to test the significant difference between two proportions. An association was considered statistically significant when P-value of 0.05 or less.

Results

The prevalence of Ms among diabetics in this study was 38.7% (155 out of 400).

Regarding age distribution of the patient according to the presence of MS, **table 1** shows that those diabetics in the age groups 60-69 years have the highest frequency of MS (38%) followed by the age group 50-59 years (32.9%.) There was significant association between age and MS (X^2= 15.85, p= 0.007).

Table 1: age distribution of the sample according to the presence of MS.

Age (Years)	Diabetics with MS		Diabetics without MS		Total	
	No	%	No	%	No	%
20 -29	0	0	7	2-8	7	1.8
30 -39	2	1.2	19	7-7	21	5.3
40 -49	34	21.9	54	22	88	22
50 -59	51	32.9	74	30	125	31
60 -69	59	38	71	28.9	130	32.5
70 -79	7	4.5	18	7.3	25	6.3
80 -89	2	1.2	2	0.8	4	1
Total	155	100	245	100	400	100

χ^2 = 15.85 **P**=0 .0007 **d.f.** = 5

Concerning sex distribution according to the presence MS, 54 male diabetics have MS (34.8%) while 101 female diabetics have MS (65.2%) as shown in **table 2.** Male: Female ratio is 0.5:1. There was a significant association statistically between sex and MS.

The mean of BMI was 28.7±5.5 KG/m2. **Table 3** shows that diabetics with BMI 30-40 have the highest frequency of MS (64.5%) and the lowest frequency of MS was found in diabetics who are non -obese (3.9%). Also there was a significant association between MS and BMI (X^2= 130.31, P=0.000001).

Table 2: Sex distribution of the sample according to the presence of MS.

Sex	DM with MS		DM with out MS		Total	
	No.	%	No.	%	No.	%
Males	54	34.8	140	57.1	194	48.5
Females	101	65.2	105	42.9	206	51.5
Total	155	100	245	100	400	100

χ^2 = 18.9, **P=** 0.001

Table 3: BMI among the sample according to the presence of MS.

BMI / kg/M2	DM with MS		DM Without MS		Total	
	No	%	No	%	No	%
<25	6	3.9	89	36.3	95	23.8
25-30	42	27.1	119	48.6	161	40.2
30-40	100	64.5	36	14.7	136	34
>40	7	4.5	1	0.4	8	2
Total	155	100	245	100	400	100

χ^2 =130.31, P= 0.000001, d.f=3

Table 4 shows BP distribution of the sample according to the presence of MS, where 129 (83.2%) diabetic patients have hypertensive with MS. And only 26 (16.8%) diabetic patients have normal BP with MS. There was a significant association between MS and Blood pressure.

Table 5 shows that 91(58.7%) diabetics with MS have normal TG and 64 (41.3%) diabetics with MS have elevated TG. Only seven patients without MS were heaving elevated TG. There was a significant association between TG & MS (X^2=219, P= 0.000001).

Table 4: showing BP disruption of the sample according to the presence of MS.

BP	DM with MS		DM Without MS		Total	
	No	**%**	**No**	**%**	**No**	**%**
Normal	26	16.8	154	62.9	180	45
Hypertension	129	83.2	91	37.1	220	55
Total	155	100	245	100	400	100

χ^2= 180, **P**= 0.000001

Table 5:-showing TG distribution of the sample according to the presence of MS.

TG	DM with MS		DM Without MS		Total	
	No	**%**	**No**	**%**	**No**	**%**
Normal TG	**91**	**58.7**	**238**	**58.7**	**329**	**82.25**
Elevate of TG	**64**	**41.3**	**7**	**2.9**	**71**	**17.75**
Total	**155**	**100**	**245**	**100**	**400**	**100**

χ^2= 219, **P**=0.000001

A significant association between HDL and MS was found as 93(60%) diabetics with MS have normal HDL and 62 (40 %) diabetics with MS have low HDL while only three patients without MS have low HDL (**Table 6**).

Concerning the association between presence of MS and complications, the majority of patients with complications were having MS (67.7 %) and this was significant statistically (X^2=41.5, P=0.0001) (**table 7**). The reported complications were as follows: retinopathy (159), neuropathy (30) and foot amputation (1).

Table 6:- showing HDL distribution of the sample a according to the presence of MS.

HDL	DM with MS		DM Without MS		Total	
	No	%	No	%	No	%
Normal	**93**	**60**	**242**	**98.8**	**335**	**83.75**
Low	**62**	**40**	**3**	**1.2**	**65**	**16.25**
Total	**155**	**100**	**245**	**100**	**400**	**100**

χ^2= 227 **P**=0.000001

Table 7: showing the association between complication and presence of MS in 400 Diabetics.

Complication	DM with MS		DM without MS		Total	
	No	%	No	%	No.	%
Yes	105	67.7	85	34.7	190	47.5
No	50	32.3	160	65.3	210	52.5
Total	155	100	245	100	400	100

χ^2= 41.5**,** **P**=0.0001

Discussion

It is essential to establish the prevalence of MS in Iraq. Whereas the global epidemic of type-2 diabetes is now well-characterized, data on the occurrence of MS in populations are limited [6] concerning prevalence, in this study was 38.7%. In the United States, the prevalence of MS was 21.8%. Mexican Americans had the highest prevalence of MS (31.9%) [1].

The prevalence of MS was high among Iraqi diabetics (38.7%). While a lower prevalence 21% in the Omani population [8] and it was 17% among Palestinians [9]. Unfortunately there is no figure of the prevalence of MS in the normal Iraqi population. A remarkable lower prevalence of the MS obtained from cross-sectional study of individuals aged 30-60 years conducted in Japan, found the prevalence of MS, being 6% for Japanese and 12% for Mongolians [10]. A high prevalence rate was showed in a study in India and reported 41.1% prevalence of MS [10]. The prevalence of MS among Arab Americans was 23% (age 20-75) [11].

This alarming figure places a large portion of diabetics at increased risk for the development of CVD. The MS is considered a risk factor for incident CVD as has been shown in several studies [12].

The current study showed that the prevalence is higher in women. Male/female ratio of the sample was 1:1.1 while the male: female ratio of patients with MS is 1:2. This can be explained by the fact that females are more prone to obesity after child birth in our society and most of them were housewives. While the prevalence was higher in men (24.6%) than in women (17.8%) in Ireland[1], the data of "the Botnia study which involving families of Finland and Sweden descent, the prevalence was 84% in males and 78% in females in subjects with type-2 diabetes [12], this may be due to different life styles among different societies.

The current study shows that the prevalence is consistently increasing with age which is statistically significant (p=0.0007). The age group 60-69 years and 50-59 years had the highest frequency of MS which can be explained by the aging process that has its effect on MS. Similar significant association was founded by Abdul-Rahim in West Bank population (2001)[9].

The most common risk factor for MS in this sample was hypertension followed by obesity unlike the AL-Lawati study in Oman (2003) [8] in which low HDL was the most common. While the prevalence of obesity was high in accordance with previous study done locally which showed that obesity is very common among type 2 diabetes [13].

Despite the fact that obesity has been linked to higher prevalence of MS, yet this study found some of the sample with normal weight has MS. Therefore, having a normal weight is not exclusively protective from the MS, thus evaluating patients for the MS should not be limited to overweight or obese individuals, as normal weight may be deceiving. Other investigators had reported this observation as

well, by finding individuals in the upper normal-weight and slightly overweight according to the BMI range that have a relatively high prevalence and are at increased risk of having the MS [14].

Regarding blood pressure there was a significant association between MS and blood pressure. This finding is natural since BP is a component of MS the same is true concerning high TG and low HDL which are also components of MS [15].

Regarding complications, the majority of diabetics with complications acquire MS. It has been documented that MS is a promoter of complications progression in diabetics [16].

From this study it was concluded that; the prevalence of MS among Iraqi diabetics according to new NCEP modified definition was 38.7%, the age group 60-69 and 50-59 years were having the higher frequency of MS, and females at higher risk to develop MS. Selecting a large sample for long period of time will give more information and knowledge about prevalence of MS in Iraq.

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** College of Medicine, Al-Nahrain University).*