

# Frequency of Metabolic Syndrome in a Sample of Adult Diabetic in Al-Tarmiyah District

Nagham Alaa Mawlood\* MBChB, Ruqaya Subhi Tawfeeq\*\* FICMS, Muheeb Salih\*\*\* FICMS

## ABSTRACT

**Background:** Metabolic syndrome is a cluster of risk factors which is responsible for excess of cardiovascular disease morbidity among overweight and obese patient and those persons with type 2 diabetes mellitus. According to the new International Diabetes Federation, for a person to be defined as having the metabolic syndrome they must have central obesity plus any two of the following four factors: raised triglycerides level, reduced HDL cholesterol, raised blood pressure and raised fasting plasma glucose or previously diagnosed type 2 diabetes.

**Objective:** To identify the prevalence of metabolic syndrome in type 2 diabetic patient in Al-Tarmiyah district and the frequency of risk factors among them that might develop cardiovascular diseases.

**Methods:** A cross sectional study on one hundred patients with type 2 diabetes mellitus was conducted from 25<sup>th</sup> December 2013 to 25<sup>th</sup> May 2014 in Al-Tarmiyah PHCC in Al-Tarmiyah district, Baghdad, Iraq. They were 33 males and 67 females. Measurements of height, weight, waist circumference, blood pressure, fasting plasma glucose and lipid profile were carried out using the new International Diabetes Federation (IDF) criteria.

**Results:** The rate of metabolic syndrome among diabetic in this study was (71%). Females in this study were more prone to have metabolic syndrome than males and those in age group (50-59) years had the highest frequency of metabolic syndrome.

**Conclusion:** This study concludes that diabetic patient is at risk for developing metabolic syndrome, gender and age are risk factors for developing such problem.

**Keywords:** Diabetes mellitus type 2, Metabolic syndrome.

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Metabolic syndrome (MetS) is recognized as a reliable long-term predictor of adverse health outcomes. Elevated prevalence rates of MetS and chronic lifestyle diseases have been documented in different indigenous groups<sup>(1)</sup>.

The metabolic syndrome is a highly prevalent clinical entity, and become one of major public health challenges, (MetS) is worldwide disease due to increase of mortality from its complications and because of long duration of disease<sup>(2)</sup>. It has been suggested that non-diabetic persons with the metabolic syndrome are at a substantial risk for the development of type 2 diabetes. The risk of type 2 diabetes is up to 5 folds higher in patients with the metabolic syndrome.

In addition, the greatest impact of type 2 diabetes in the 2-4 times greater risk of coronary heart disease and cerebrovascular disease<sup>(3)</sup>.

The prevalence of (MetS) is dramatically increasing worldwide as a consequence of the continued obesity epidemic, and as a result will have a substantial impact on the global incidence of cardiovascular disease<sup>(4)</sup>. In Iraq, study of metabolic syndrome looks an area of interest since like other Arab and Muslim countries<sup>(5)</sup>. Most studies show that the metabolic syndrome is associated with an approximate doubling of cardiovascular disease risk and a 5 - fold increased risk for incident type 2 diabetes mellitus<sup>(6)</sup>.

Substantial socioeconomic and demographic changes have taken place in countries of the Eastern Mediterranean region (EMR) over the past two decades. The population of this region has almost

\*Baghdad Health Directorate.

\*\*Dept. of Community Medicine. Al-Iraqia Medical College.

\*\*\*Tikrit Medical College.

doubled, more people are living into older age, and the proportion of the urban population has been increasing. The transition from a rural to an urban life style is associated with a deterioration in the cardiovascular disease risk profile because of adverse changes in dietary habits and physical activity pattern. Although cardiovascular disease and its clustering of risk factors (MetS) have been a feature of westernized societies, cardiovascular disease is now emerging as a major health concern in developing countries, including countries of the Eastern Mediterranean region<sup>(7)</sup>.

## Methods

This is a cross-sectional study with the variables carried out on attendance of Al-Tarmiyah primary health care center. The study was carried out on the adult population aged 20 years and above, a total of 100 diabetic males and females patients participated in this study. for almost around 6 months from period 25<sup>th</sup> December 2013 to 25<sup>th</sup> May 2014 and about 5 days/week, 5 hours daily.

The following inclusion criteria were used; all adult type 2 diabetes who attended the primary health care center in al-Tarmiyah district during the period of study, starting from age of 20 years and above including both genders.

The following exclusion criteria were used; pregnant women, type 1 diabetes patients, patients who refused to participate, and those with incomplete information who accounted about 23 patients.

Strengths and limitations of this study; it is the first study to report the impact of diabetes on developing metabolic syndrome in Al-Tarmiyah district.

Cross-sectional data cannot assess the effect of lifestyle on the incidence of metabolic syndrome, and longitudinal cohort studies are, therefore, needed.

The small sample size is due to Al-Tarmiyah district still suffering from inaccessible health facilities because of it is

large numbers of villages and loss of follow up of diabetic patients once when diagnosed as a case of diabetic most of them attend private sector which have no collaboration strategy with public health regarding the registration of data.

The metabolic syndrome was defined using the International Diabetes Federation (IDF) criteria; in which for a person to be defined as having the metabolic syndrome he must have: central obesity (defined as waist circumference  $\geq 102$  cm for men and  $\geq 88$  cm for women), plus any two of the following four factors: Raised TG level  $\geq 150$  mg/dL (1.7 mmol/L), or specific treatment for this lipid abnormality. Reduced HDL cholesterol  $< 40$  mg/dL (1.03 mmol/L) in men and  $< 50$  mg/dL (1.29 mmol/L) in women, or specific treatment for this lipid abnormality. Raised blood pressure: systolic BP  $\geq 130$  or diastolic BP  $\geq 85$  mm Hg, or treatment of previously diagnosed hypertension. Raised fasting plasma glucose (FPG)  $\geq 100$  mg/dL (5.6 mmol/L), or previously diagnosed type 2 diabetes<sup>(6)</sup>.

Each patient was subjected to a special form of questionnaire by direct interview. Examination included: Blood pressure (systolic and diastolic) by using a new mercury sphygmomanometer. Height and weight. Body mass index was calculated according to the following equation: BMI = weight (kg) / height (m)<sup>2</sup>.

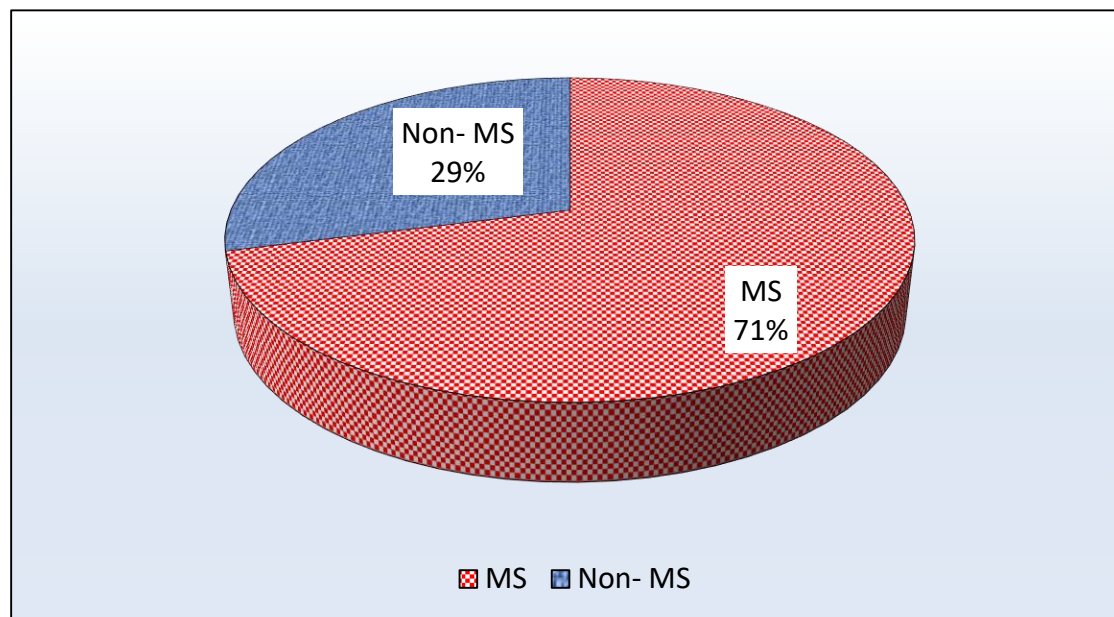
Investigations: include biochemical profile for blood sugar, lipid and insulin levels was assessed in all patients, blood sample was taken from fasting patients (before breakfast) around 8-10 am in Al-Tarmiyah primary health care center laboratory.

The collected data have been transferred to the computer on the SPSS manager system (the statistical package for social sciences) version no. 15. Both descriptive and analytic statistics have been carried out and the relation between the variables by using  $\chi^2$ , student t test, and ANOVA (Analysis of Variables) was used to compare between means of numerical variables when we have multiple observation at each level. The level of

statistical significance of P value was  $\leq 0.05$ .

The frequency of metabolic syndrome in this study was 71(71%) out of 100 patients with type 2 diabetes, and 29 (29%) of them had no features of metabolic syndrome, (Figure 1).

## Results



**Figure 1: The frequency of metabolic syndrome among diabetic patients.**

The highest frequency of developing metabolic syndrome was among age (50–59) years (34.6%); followed by age group (60-69) years (28%), (Table 1).

Most of the patients (67%) were females, (79%) patients among them developed feature of MS. while (33%) patients were of male gender, (21%) patients of them had features of MS, (Table 2).

Table (3) showed that (93%) patients developed metabolic syndrome had abnormal waist circumference, while (7%) of them were with normal waist circumference.

Table (4) showed that (35%) of patients developed metabolic syndrome had pre hypertension, (22.5%) of them developed metabolic syndrome; while (31%) of them

had stage 1 hypertension and (31%) of them had stage 2 hypertension.

Table (5) showed the distribution of type 2 diabetic patients according to s. insulin level, 31(43.7%) patients of them developed metabolic syndrome.

Table (6) showed the distribution of type 2 diabetes patients having metabolic syndrome according to the IDF criteria, 14 (93.3%) males and 52 (92.9%) females had abnormal waist circumference. Thirteen (86.7%) male and 41 (73.2%) female patients had hypertension. Fourteen (93.3%) males and 56 (100%) females had high fasting plasma glucose. Fifteen (15%) type 2 diabetic patients (all of them were females) had abnormal s. HDL cholesterol measure. Seven (46.7%) males, and 38 (67.9%) females had abnormal s. TG cholesterol level.

**Table 1: Distribution of type 2 diabetic patients according to age.**

Age in years	DM with MS	DM without MS	Total	
			No.	%
<39	1	4	5	5
40-49	17	4	21	21
50-59	31	14	45	45
60-69	20	6	26	26
70 ≥	2	1	3	3
Total	71	29	100	100

**Table 2: Distribution of type 2 diabetic patients with MS according to gender.**

Gender	DM with MS		DM without MS		Total	
	No.	%	No.	%	No.	%
Male	15	21	18	62	33	33
Female	56	79	11	38	67	67
Total	71	100	29	100	100	100

**Table 3: The distribution of diabetic patient according waist circumference and MS development.**

Waist circumference	DM with MS		DM without MS		Total	
	No.	%	No.	%	No.	%
Normal	5	7	11	37.9	16	16
Abnormal	66	93	18	62.1	84	84
Total	71	100	29	100	100	100

**Table 4: Distribution of diabetic patient according to BP level and MS development.**

HT	DM with MS		DM without MS		Total	
	No.	%	No.	%	No.	%
Normal	1	1.4	2	6.9	3	3
Pre hypertension	16	22.5	19	65.5	35	35
Stage 1 hypertension	27	38	4	13.8	31	31
Stage 2 hypertension	27	38	4	13.8	31	31
Total	71	100	29	100	100	100

**Table 5: The distribution of diabetic patient according to insulin level and MS development.**

Insulin level μIU/mL	DM with MS		DM without MS		Total	
	No.	%	No.	%	No.	%
<3	4	5.6	3	10.3	7	7
3-17	36	50.7	16	55.2	52	52
>17	31	43.7	10	34.5	41	41
Total	71	100	29	100	100	100

**Table 6: Metabolic syndrome criteria among (males and females).**

MS criteria	DM with MS				Total	
	Male		Female			
	No.	%	No.	%	No.	%
WC ≥ 102 cm in male ≥ 88 cm in female	14	93.3	52	92.9	66	66
BP ≥ 130/85	13	86.7	41	73.2	54	54
FPG ≥ 100 mg/dl	14	93.3	56	100	70	70
HDL < 40 mg/dl in male < 50 mg/dl in female	0	0	15	26.8	15	15
STG ≥ 150 mg/dl	7	46.7	38	67.9	45	45

## Discussion

The alarming figure of the prevalence in this study (71%) places a large portion of diabetics at increased risk for the development of cardiovascular disease<sup>(8)</sup> because of diabetes, in addition to that the metabolic syndrome is considered a risk factor for episodes of cardiovascular disease as has been shown in different studies which further aggravate the situation<sup>(9)</sup>.

The result of this study agree with previous study of Judah et al in Babel Governorate (66.5%)<sup>(2)</sup> and Nasir Ahmed et al in Pakistan in (76%)<sup>(11)</sup>. While the result of this study is higher than previous study of Al-Rubaye in Baghdad (38.7%)<sup>(12)</sup>, while the result of this study is lower than that of a previous study of Mansour in Basrah (86%)<sup>(13)</sup>, and Basol G et al (87.2%) out of 235 patients in Turkey during 2011<sup>(14)</sup>, and Mohsin et al (85.8%) out of 106 patients in Pakistan during 2007<sup>(15)</sup>. The prevalence of the metabolic syndrome increased with age in this study (50-59) and (60-69), in both men and women, with sharp increase after the third and fifth decades of life usually due to that the age-related changes in body size, fat distribution, and insulin sensitivity contribute to the increase prevalence of this syndrome with age<sup>(9,11)</sup>. This result agrees with previous study of Al-Rubaye in Baghdad which can be explained by the aging process that has its effect on metabolic syndrome<sup>(12)</sup>. Increase prevalence among women can be explained by increase prevalence of obesity among them as a result of several cultural and social factors such as multiple pregnancies, high unemployment, over eating and physical inactivity<sup>(12)</sup>. In this study, most of females were housewives and most of their activities were indoor and the intensity of such activities were of light forms especially for those between 30-50 years, hormonal predisposition also play a big role as multiple pregnancies lead to further fat deposition<sup>(17,18)</sup>. The result of this study agrees with most of previous studies<sup>(19,20)</sup>. The insulin resistance can directly affect vascular signaling, eventually

leading to proliferation of smooth muscle cells in the vessel wall and increased rates of intimal expansion and eventually a high blood pressure, in addition, obese people tend to have an elevated blood pressure compared with lean people<sup>(16)</sup>. In this study, it was concluded that the prevalence of metabolic syndrome among type 2 diabetic patients in Al-Tarmiyah district was (71%) according to IDF criteria. Thus, they are at a considerably risk of atherosclerotic cardiovascular disease and cerebrovascular disease, and their clinical complications and finally increase their mortality rate. So, it is important to identify and follow subjects with metabolic syndrome, even in apparently healthy population, to enable early disease management.

In conclusion; this study concludes that diabetic patient is at risk for developing metabolic syndrome, gender and age are key risk factors for developing such problem.

Recommendation: Iraq can take a series of actions, in line with the objectives of the WHO NCD Global Action Plan 2013-2020, to reduce the impact of diabetes: establish national mechanisms such as high-level multi-sectoral commissions, build the capacity of ministries of health, prioritize actions to prevent people becoming overweight and obese, strengthen the health system response to NCDs, including diabetes, particularly at primary-care level, address key gaps in the diabetes knowledge base and strengthen national capacity to collect, analyze and use representative data on the burden and trends of diabetes and its key risk factors<sup>(21)</sup>.

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