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Prevalence of Metabolic Syndrome and its Components among Obese Patients in Sulaimaniyah City-Iraq

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Abstract
Background: Metabolic disorder is characterized as a design of unsettling metabolic influences, including central obesity, hyperglycemia, and hypertension.
Objective: To assess the popularity of metabolic syndrome and its components in corpulent patients at Saholaka Polyclinic of Sulaimanyiah city –Iraq.
Methods: One hundred admitted patients to the polyclinic of Saholaka were examined. It was started by measuring the weight and height of the patients. Next, each patient's data were employed to the Body Mass Index. In addition to the preliminary result, the waist and hip measurements were taken to obtain the waist/hip ratio. Finally, baseline blood samples were collected from the patients who were instructed to fast and not eat since at least ten hours before the test to assist in obtaining accurate results glucose level, and lipids total cholesterol, triglyceride, low-density lipoprotein, and high-density lipoprotein. **Results:** The existence of metabolic syndrome is 67% among the female group and 33% among the male group, which indicates obesity is higher among females by 34%. However, the difference without statistical significance equals to 0.17 ($p = 0.17$). The criteria of Metabolic Syndrome in obese patients were observed, and the conclusions came out as follows: HDL 73%, triglycerides 31.2%, systolic blood pressure 54.1%, diastolic blood pressure 34.3, glucose 30.2% and waist circumference 100%. The outcomes are not statistically significant ($P \geq 0.05$). The metabolic syndrome were diagnosed in 63.65% of the participants, most of whom corresponding to the female group.
Conclusion: Metabolic syndrome is common in obese patients. It was concluded that proper measures should be applied in all healthcare levels to avoid and treat both metabolic syndrome and its components.

Keywords: obesity, metabolic syndrome.

1. Introduction

The metabolic disorder, MetS, is characterized as a design of unsettling metabolic influences, including central obesity, hyperglycemia, and hypertension. [1,2] The International Diabetes Federation recently reported an IDF assessment in which the prevalence of MetS reached 17.7%. The assessment proposes that obesity is an integral component of MetS [3]. The federation also diagnosed two new criteria of metabolic syndrome, which both permitting three of five components, high fasting triglyceride, glucose intolerance, central obesity, low HDL cholesterol, and hypertension. Meanwhile, IDF submits that central obesity is a fundamental component [4] to be added to this benchmark. However, the AHA/NHLBI recommended, it is voluntary whether to consider central obesity as one of the main components among the factors or not [5].
According to the BMI standards, any results greater than $30\ kg/m^2$ exemplifies obesity. In this study, we measured obesity by the BMI along with waist circumference, WC, and waist to hip ratio (WC/H). These ratios are useful and precise indicators of nutritional status. According to a study of Food and Agriculture Organization of the United Nations, over half, 53% of all death cases in women with a BMI greater than 29 Kg/m2 could be directly referred to their obesity, and nutrient factors that include fat, carbohydrates type glycemic index of foods and fiber[6]. Metabolic equivalents or Energy Expenditure abbreviated as MetS define obesity and overweight as a risk factor [7]. Approximately 35% of US adults have metabolic syndrome, and as people age, the frequency rises until it affects approximately 50% of people aged 60 and above [8]. Mets are quickly expanding in predominance broadly in affiliation with the rising of overweight and obesity. Besides, high rates of obesity are linked with type 2 diabetes. Hence, metabolic syndrome became a primary public

concern in the U.S. [4,9,10]. Gaining weight is associated with greater levels of triglycerides, low-density lipoprotein cholesterol, and lower levels of high-density lipoprotein cholesterol [11]. The aim of the research is to assess the frequency of metabolic syndrome and its components in obese patients at Saholaka Polyclinic of Sulaimanyiah city (Iraq).

2. Patients and Methods

Study Population: One hundred patients were studied who presented to the Polyclinic of Saholaka, seeking weight reduction. No accounting considered for racial variables Inclusion criteria were patients aged above 20 years, obese(BMI=> 30kg/m^2) or overweight (BMI >25 to 29.9 kg/m^2). Exclusion criteria were patients aged below 20 years. The Scientific Committee of the Faculty of Agricultural Engineering Sciences reviewed and approved the study procedure and conduct. Patient written approval was obtained before recruiting the patient in the study.
It was started by measuring the weight and height of the patients at the first appointment with the patients. Next, each patient's data were employed to the Body Mass Index or the BMI system. In addition to the preliminary result, Measurements of the hips and waist were taken. to obtain the waist/hip ratio.

A data form formulated containing the following:

- Date
- Name
- Gender
- Age
- Marital status
- Graduation
- Occupation
- Personal (family) income:
- Family history
- Chronic diseases
- Case disease
- Anthropometric measurements (weight, height, waist circumference)
- Nutritional intake
- Kind of foods
- Blood pressure
- Exercise
- Laboratory tests (Fasting plasma glucose, lipid profile)

A meticulous history was obtained, focusing mainly on the obesity case disease, progression, chronology, trials to decrease weight and family history of obesity. The history also included past medical and surgical history and drug history. Nutritional history obtained regarding the quality of foods the patient takes regularly and also the quantity of the food taken by the patient roughly estimated as high, middle, and inferior. Exercising of any kind questioned and estimated by the hours per day and days per week. The patient's socioeconomic status was determined.
A full physical examination performed looking specifically for any signs of obesity complications as manifestations of diabetes mellitus, hyperlipidemia, and complications of systemic hypertension.
Grading of obesity established according to the BMI as following, using the WHO and International Obesity Task Force [12]:

BMI (kg/m^2)		Classification
18.5 - 24.9		Reference Range
25.0 – 29.9		Overweight
>30.0		Obese
30.0 - 34.9		First case
35.0 - 39.9		Second case
>40.0		Third case

Blood pressure was obtained on two occasions with consideration for the cuff size, and the highest reading was taken as the final result.
baseline blood samples were obtained from patients at a time who were fasting to measure the levels of Glucose, Lipids "Total Cholesterol-TC, Triglyceride-TG, low-Density Lipoprotein-LDL, High-Density Lipoprotein-HDL," Equally important, all of the patients had instructed in advance to fast 10 hours prior to the blood sample test.

Biochemical Analysis and Definitions

Plasma glucose, lipid profile, were determined with Biolyser 300 (full automate chemical analyzer). Metabolic Syndrome was diagnosed if the patients' results met three or more of the following criteria (AHA/NHLBI 2005) [5]:

1. Abdominal obesity (male waist > 102 cm; female waist > 88cm)
2. Triglycerides ≥ 150 mg/dl or on TG lowering treatment.
3. HDL cholesterol (male < 50) or on HDL improvement treatment.
4. Blood pressure ≥ 130 / ≥ 85 or on blood pressure treatment.
5. Fasting glucose ≥ 100 mg/dl or on glucose-lowering treatment.

Statistical analysis

All the data were submitted into the standard deviations' and means' formulas for analysis. The percentages of all components of metabolic syndrome were calculated. Also, Fisher's identical test was used to detect numerical variations in the existence of metabolic syndrome benchmark considering their gender.
The T-test was calculated to detect the numeric significance of p less than 0.05 in clinical and biochemical attributes in different sexes.

3. Results

One hundred patients were arranged. Despite presuming all the patients to be obese or overweight, unlikely, 96% of the patients met the embodiment criteria.
Table 1 indicates the clinical and demographic attributes of sex frequency, which is 90, 93.75% females, and 6, 6.25% males.
Table 2 summarizes the Biochemical attributes along with HDL, LDL, triglycerides, and glucose, following their gender. Importantly enough, as expected, there is a significant variation between the means.
Table 3 and Table 4 describes the Metabolic review and the Metabolic Syndrome criteria according to gender in where the frequency of Metabolic Syndrome is higher in females 67% than males 33% with the absence of statistical significance, p = 0.17. With paying attention to the Metabolic Syndrome criteria in obese patients, the results were as follows:
HDL 73%, triglycerides 31.2%, systolic blood pressure 54.1%, diastolic blood pressure 34.3, glucose 30.2%, and waist circumference 100%. The results were not statistically significant as the p- values were above 0.05. The Metabolic Syndrome was diagnosed in 63, 65% of the total number of the patients whom most were from the female group. Meanwhile, the result was not numerically significant as P-value was 0.17, which is above 0.05.

Table 1 Clinical attributes according to gender

Attribute	Females (n=90) (Mean ± Standard Division)	Males (n= 6) (Mean ± Standard Division)	P-Value
Age (years)	33.6 ± 10	29.3 ± 7	0.20
Weight (kg)	89.1 ± 15	99.9 ± 19	0.24
Height (m)	160.6± 7	173.3 ± 2.8	3.16
Body mass index	34.5 ± 6.1	29.3 ± 5.9	0.58
Blood pressure (systolic)	130.4 ± 19.9	125 ± 8.3	0.20
Blood pressure (diastolic)	81.4 ± 11.6	78.3 ± 7.5	0.37

Table 2 Biochemical characteristics according to gender

Attribute	Females (n=90) (Mean ± Standard Division)	Males (n= 6) (Mean ± Standard Division)	P-Value
Glucose (mg/dL)	98.3 ± 38.9	90 ± 22.2	0.42
Triglycerides (mg/dL)	136.3 ± 63.4	100 ± 35	0.9

HDL (mg/dL)	42.4 ± 12	43.8 ± 10.6	0.7

Table 3 Metabolic profile and metabolic

Attribute	Females (n=90) (Mean ± Standard Division)	Males (n= 6) (Mean ± Standard Division)	P-Value
Waist circumference	90 (100)	6 (100)	96 (100)
Blood pressure (systolic)	48 (53)	4 (66)	52 (54.1)
Blood pressure (diastolic)	32(35)	1(16)	33 (34.3)
Glucose	27 (30%)	2 (33%)	29 (30.2)
Triglyceride	29 (32)	1 (16)	30 (31.2)
HDL	68 (75)	3 (50)	71 (73)

Table 4 Metabolic syndrome according to gender

Character	Male n (%)	Female n (%)	Total n (%)
Metabolic syndrome	61(67)	2(33)	63(65.6)

Fisher's Identical Test, “The Two-tailed Test”

4. Discussion

A group of metabolic disorders known as the metabolic syndrome (MetS) raise the risk of cardiovascular disease (CVD) and type 2 diabetic mellitus (T2DM) [13] . Metabolic syndrome is common in obese patients [5]. This study aimed for the prevalence of metabolic syndrome in obese and overweight patients and each biological and biochemical components of this syndrome. The quantity of the patients was not excellent; however, it is hoped this will be an introductory point for the upcoming studies of the future.

As mentioned earlier, metabolic syndrome was diagnosed in 63 patients, 65%, most of who were from the female group. However, this was not numerically compelling because the p-value was 0.17, which is above 0.05. On the contrary, in one of their studies, of O Ogbera diagnosed 834 patients with the Metabolic syndrome, 86%. The prevalence of having Metabolic Syndrome was roughly alike for both genders, 86% women, and 83% men. Furthermore, the most occurred risk factor was abdominal obesity [14].

The commonness of the Metabolic Syndrome globally is approximated to be between 17-25% [15, 16], While some studies indicate a more significant frequency the metabolic syndrome in men [17, 18] than women, some others report the results to be in contrast [19]. Nearly one in three Indian individuals, according to a systematic review published in 2020, have MetS [20]. Equally important, among the elements of the metabolic syndrome, female patients showed remarkably higher values than males; waist circumference 90%, blood pressure 48%, and HDL 68%. The results were not statistically significant. The result of a study indicates the importance of waist circumference in Metabolic Syndrome. It shows that the frequency of metabolic syndrome in patients with large waist circumference as defined by NCEP-ATP [21]. The World Health Organization, WHO recommends waist circumference as ways of spotting persons at risk of morbidity associated with central adiposity [22]. WHO also reports, adult women and men with a waist circumference of greater than 88cm and 102 cm, respectively, are considered to have a higher risk of obesity-related disorder and metabolic syndrome than those with smaller measurements [23]. Waist circumference was 110.5 ± 15.1 in females and 108.6 ± 5.7 in males. Ogbera reported that most of the metabolic variables in the female group are more abundant, as was seen with the male and metabolic variables were smaller in-group with average waist circumference and BMI [14]. This is similar to our findings. Regionally Speaking, a typical survey among Qatari adult population who were 20 years or older, found that the optimum limit value of Waist circumference to predict metabolic syndrome was 99.5 cm and 91cm in men and women, respectively [24]. Also, a study from the Basra province in Iraq reported a slightly different Waist circumference value of 97cm for men and 99cm for women to identify the metabolic syndrome using the IDF criteria [25].

When cardiac output and systemic vascular resist, they result in blood pressure, and cardiac output is the flow to the adipose tissue [26]. In the existence of hypertension in metabolic syndrome in a study, gender differences were recorded, which its occurrence was 67% [16]. This rate is higher than our result. Boban et al. reported that the prevalence of hypertension is 42% in obese women (BMI>30) [27], and this close to the result we have obtained. However, according to the Nigerian study reports, there are remarkable gender differences in blood

pressure, and females discovered to have outstanding larger rates of Blood Pressure than men [16], and this is similar to our finding.
Moreover, HbA1c and especially insulin levels are linked with metabolic syndrome criteria, their clustering, and insulin resistance. Insulin can be a sign of the occurrence and development of metabolic syndrome [28]. In this study, females showed a fasting blood glucose of 98.3 ± 38.9, and males showed fasting blood glucose of 90 ± 22.2, and 30.2% fulfilled the criteria of metabolic syndrome. Genetic factors may cause the differences of these conditions above, physical activity pattern, dietary habits, economic situation, energy intake and expenditure of both women and men and other lifestyle differences [7, 29, 30].

5. Conclusion

Metabolic syndrome is common in obese patients. It was concluded that proper measures should be applied in all healthcare levels to stop and cure both metabolic syndrome and its components.

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