



## Obesity Parameters in Polycystic Ovary Syndrome in Duhok City

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Article info	Abstract
Original: 10 August 2020 Revised: 28 October 2020 Accepted: 29 November 2020 Published online: 20 June 2021	<b>Background:</b> PCOS is linked to obesity, increased risk of metabolic syndrome, and cardiovascular adverse manifestations. About 30-75% of women with PCOS are obese. <b>Aim of the study:</b> This study aimed to estimate the obesity parameters in PCOS and compare these results to women without PCOS. <b>Methods:</b> In this cross-sectional study, the BMI and Waist/Hip ratio of 150 women with established PCOS according to the diagnostic criteria were compared to 100 age-matched healthy women . <b>Results:</b> 95 patients and 50 of the comparison group were obese. The difference in the mean of BMI in PCOS patients and the comparison group was statistically highly significant ( $P < 0.001$ ). The Waist/Hip ratio was above 0.85 in 91 patients and 73 healthy individuals and statistically, the difference was not significant when a cut-off point of 0.85 is considered ( $P > 0.05$ unpaired T-test). <b>Conclusions:</b> BMI was found to be a more sensitive parameter than Waist/Hip ratio, in the determination of obesity-associated with PCO.
<b>Key Words:</b> Obesity, PCOS, BMI, W/H.	

### 1- Introduction

Currently, polycystic ovary syndrome (PCOS) is considered as the most common cause of female infertility [1]. It is also the most prevalent endocrinopathy in women and approximately affects 7-8% of females in their reproductive era [2, 3], however, a higher prevalence rate of 5-15% was also reported [4]. The known PCOS diagnostic criteria are; NIH (National Institute of Health) (1990), Rotterdam criteria (2003), and AES (Androgen Excess Society) (2006). Not only to obesity, but PCOS is also linked to increased risk of metabolic syndrome and cardiovascular adverse manifestations [5]. The relation between PCOS and obesity is bi-directional, each exacerbates the other in a cyclical manner that is never-ending [6]. 30-75% of women with PCOS were reported as obese [7].

The best-known parameters for obesity are the body mass index (BMI) and waist circumference. The latter is more information about visceral adiposity [8]. BMI is used to estimate human density while the percentage of body fat is concerned with the amount of fat in the body. Waist circumference (WC), waist/height ratio (WHtR) and waist/hip ratio (WHR) are other indicators of central obesity [9].

The body mass index is calculated by the following equation:  $BMI = \text{Weight (Kg)} / \text{Length in (m}^2\text{)}$  and the waist / Hip ratio was estimated by dividing the waist girth as estimated at the midpoint between the iliac crest and the lower margin of the ribs by the hip girth as expressed by the average circumference around the buttock posteriorly and indicated anteriorly by the symphysis pubis [10].

The present study aimed to determine BMI and W/H ratio as indicators of obesity in patients with PCOS and compare these indices to healthy women with no features of PCOS.

## 2- Patients and methods

### 2.1. Study design and sampling

A cross-sectional non-interventional study was conducted in Duhok City in the Kurdistan region of Iraq from 1/7/2019 to 1/10/2019.

The study included 150 patients who proved to have PCOS diagnosed according to Rotterdam diagnostic criteria and a comparison group of 100 healthy fertile women as a comparison group nearly matched for age. Each patient was interviewed individually and evaluated clinically for signs and symptoms of PCOS.

### 2.2. Inclusion and Exclusion criteria

Patients who had 2 or more of the Rotterdam diagnostic criteria were included in this study. Patients with hyperprolactinemia and thyroid disorders were excluded from the study.

### 2.3. Diagnostic and measurement criteria

We relied on Rotterdam diagnostic criteria for the diagnosis of PCOS in this study, and the diagnosis was defined when 2 or more of the 3 criteria were present: oligo/amenorrhea, clinical and/or biochemical hyperandrogenism, and ultrasound polycystic ovaries.

All the patients underwent ultrasonic evaluation of the ovaries, using the concept of ultrasonic PCO morphology which is the presence of > 12 follicles with a diameter of 2 to 9 mm in the ovary & ovarian volume > 10 mL [11]. Hormonal assay including FSH, LH, Prolactin, TSH, Androstenedione, and DHEA was also performed for all patients, and all the hormones were tested by VIDAS (bioMérieux) Based on the Enzyme-Linked Immune-Fluorescent Assay (ELIFA) technology. The body mass index was measured depending on the equation:  $BMI = \text{Weight (Kg)}/\text{Length in m}^2$ .

The waist girth was measured with a tape measure and divided by the hip girth. Waist girth was estimated between the iliac crest and lower rib margin at the midpoint. The hip girth was later reported as the maximum diameter around the buttock, and the symphysis pubis indicated anteriorly.

The patients and the healthy individuals were grouped according to their BMI and W/H ratio. When the BMI is less than 18.5 this is considered underweight, and when the BMI is between 18.5 – 24.9 which is considered normal. Overweight patients were those who had a BMI between 25-29.9. When the BMI is 30-39.9 and more than 40, the persons were assigned as obese and morbidly obese [10]. The value W/H ratio of < 0.85 was taken as a cut-off value between normal and those with central obesity according to WHO guidelines [12].

### 2.4. Statistical Analysis

The descriptive purposes of the study were presented in mean and standard deviation or frequency and percentage. The comparison of general information between the two groups was examined by an independent t-test.  $P < 0.05$  was considered a statistically significant difference. The statistical calculations were performed by Statistical Package for the Social Sciences version 24.0 (SPSS, BM, USA).

## 3- Results

This study included 150 patients with PCOS and 100 healthy women with matched ages. The patients and the comparison subjects were grouped according to their ages. The patient's ages ranged between 19-45 years with a mean of 29.5 years. The mean age of the comparison group was 30.1 years and their ages ranged from 20-42 years (Table 1).

Depending on Rotterdam's criteria, the diagnosis of PCOS was established in 115 patients by the 3 diagnostic criteria and 35 patients by 2 out of the 3 criteria of menstrual changes, hyperandrogenism, and ultrasonic evidence of polycystic changes (Figure 1). Those 35 patients with two diagnostic criteria; 13 of them had menstrual irregularities with ultrasonic evidence of PCO, 8 had ultrasonic evidence of PCO with biochemical hyperandrogenism and 14 had ultrasonic evidence of PCO and hirsutism (Figure 2).

Concerning the BMI, 95 patients and 50 of the comparison group were obese and table 2 shows the distribution of BMI among all the included patients and healthy individuals.

The mean BMI in PCOS patients was 32.3 ( $\pm 5.9$  SD) and the comparison group is 28.9 ( $\pm 5.01$  SD). Statistically, the difference between the two groups was highly significant ( $P < 0.001$  unpaired T-test).

The W/H ratio was above 0.85 in 91 patients and 73 healthy individuals and statistically the difference was not significant when a cut-off point of 0.85 is considered ( $P > 0.05$  unpaired T-test).

Lastly, Table 3 shows the summary of BMI and W/H ratio in all the included patients and healthy individuals.

Table 1: The age groups of PCOS patients and the comparison group.

Age in years	PCOS patients		Comparison group	
	No.	%	No.	%
< 20	3	2	2	2
20-24	12	8	10	10
25-29	42	28	38	38
30-34	65	43.3	40	40
35-39	24	16	8	8
40 & >	4	2.7	2	2
<b>Total</b>	<b>150</b>	<b>100%</b>	<b>100</b>	<b>100%</b>

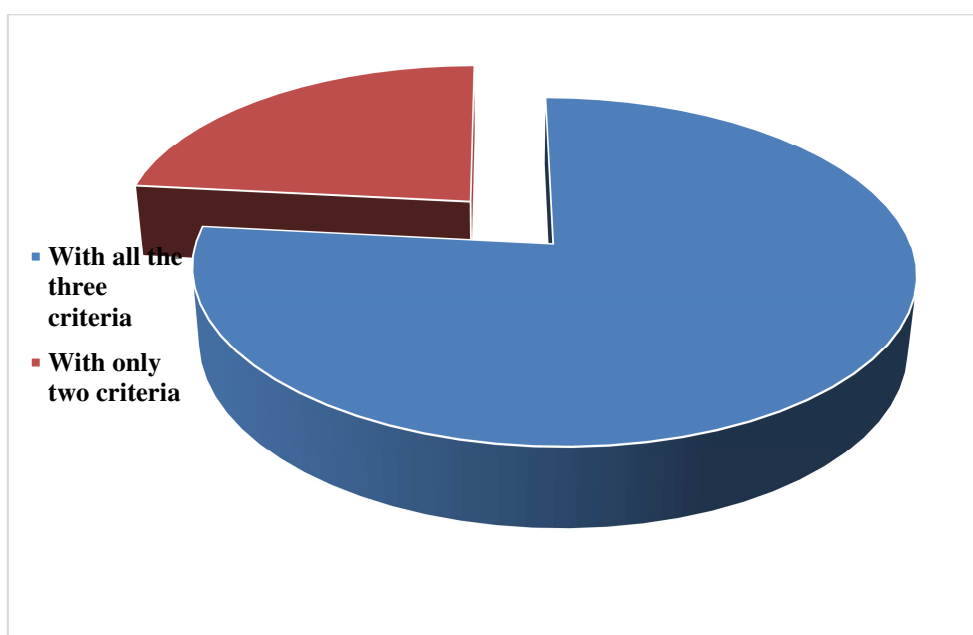


Figure 1: Distribution of PCOS patients according to Rotterdam's criteria.

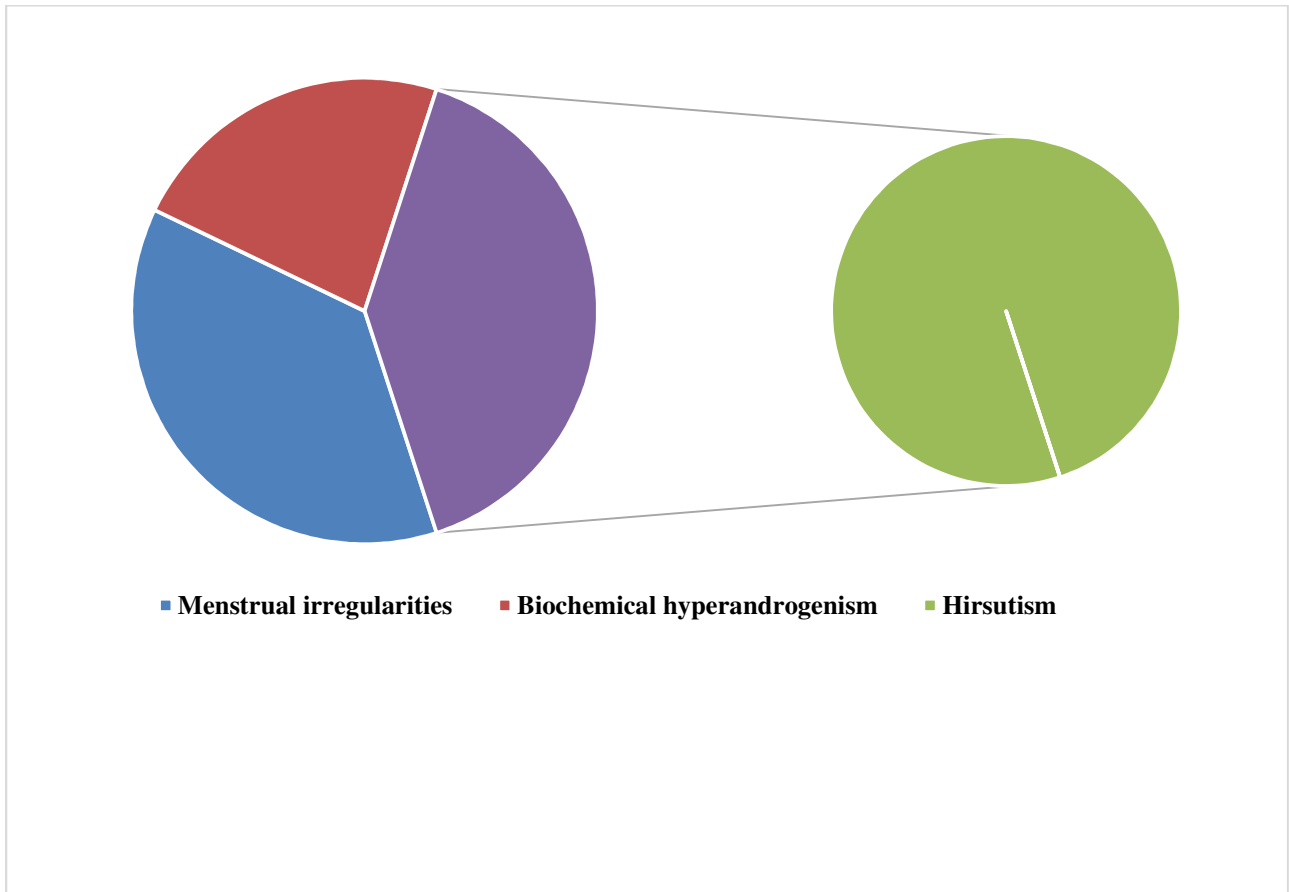


Figure 2: PCOS patients with two diagnostic criteria. Ultrasonic findings were common for all the 35 patients.

Table 2: BMI (Kg/m<sup>2</sup>) among patients and the control groups.

Group	BMI	PCOS Patients		Comparison group	
		No.	%	No.	%
Underweight	< 18.5	0	0	1	1
Normal	18.5-24.9	21		24	24
Overweight	25-29.5	27		23	23
Obese	30 -39.9	95		50	50
Morbid obesity	> 40	7		2	2
<b>Total</b>		150		100	

Table 3: BMI (Kg/m<sup>2</sup>) and the W/H ratio in both groups.

Parameter	PCOS patients		Healthy individuals	
	Mean	SD	Mean	SD
<b>BMI</b>	32.3	5.9	28.9	5.01
<b>W/H Ratio</b>	0.82	0.066	0.8	0.065

#### 4- Discussion

PCOS is typically associated with obesity in women [13] and has significant consequences on metabolic and reproductive health [14].

In clinical practice, BMI is the most important criterion for obesity. In this study 95 patients and 50 of the comparison group were obese. The mean BMI in PCOS patients was 32.3 (±5.9 SD) and for the comparison group is 28.9 (±5.01 SD), the difference between the two groups was highly significant. 409 PCOS women

and 7057 non-PCOS women were followed up in a population-based observational study, and mean BMI was also significantly higher in the PCOS group than the control group [15]. On the other hand, in her research, Sam (2007) found that the increased prevalence of PCOS in overweight and obese women was independent of the degree of obesity [16].

The android distribution pattern of fat may be the result and the cause of hyperandrogenism, and this will lead to a vicious circle of hyperinsulinism, hyperandrogenism, central adiposity, and metabolic abnormalities [17]. In this study, the W/H ratio was above 0.85 in 91 patients, and in 73 healthy individuals and statistically, the difference was not significant with a cut-off point of 0.85. The reason for a higher prevalence of central obesity in our patients and comparable groups can be related to the local food patterns and lifestyles. Al-Bayatti A (2006), in a study, found that among the obese PCOS (BMI >25) 26 patients (60%) had central obesity compared to only 2 (28%) of obese control [18].

Milnerowicz and Madej (2017) reported that abdominal obesity causes additional disorders in the metabolic profile in women with PCOS [19].

Therefore, weight reduction is proposed as an initial management strategy in women with PCOS.

## 5- Conclusion

In conclusion, BMI was found to be a more sensitive parameter in the determination of obesity-associated with PCOS; however, W/H ratio was not found to be a sensitive indicator to differentiate between obesity-associated with PCOS and normal controls.

## Limitations of the study and Recommendations

The most obvious limitation of the present study is the small sample size. Further studies are recommended with a larger sample size.

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## Conflicts of interest

There are no conflicts of interest.

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