Epidemiology of Polycystic Ovary Syndrome (PCOS) Among Women in Misan Province

Wassan Mohammed Saed

MBChB. DGO. (Obstetrics and Genecology), Misan, Iraq

Abstract

Background: Polycystic Ovary Syndrome (PCOS) is a common endocrine disorder among women of reproductive age, characterized by ovulatory dysfunction, hyperandrogenism, and polycystic ovarian morphology. It is associated with significant reproductive, metabolic, and psychological complications. In Iraq, the burden of PCOS is believed to be underreported despite growing public health concern.

Aim of the Study: To estimate the prevalence of PCOS among women attending gynecology outpatient clinics in Misan city, and to evaluate its association with lifestyle, clinical, and metabolic factors based on Rotterdam criteria.

Methods: A cross-sectional study was conducted from January to December 2024 and included 200 women aged 18–45 years presenting with menstrual irregularities or hyperandrogenic features. Women on hormonal therapy, pregnant or lactating, or with other endocrine disorders were excluded. Data collected included sociodemographic information, menstrual and medical history, lifestyle and dietary habits, and clinical examination findings. Hormonal and metabolic markers were assessed via blood tests, and pelvic ultrasound was used to confirm polycystic ovarian morphology. PCOS was diagnosed using the Rotterdam criteria.

Results: Out of 200 participants, 123 (61.5%) were diagnosed with PCOS. A sedentary lifestyle and high-calorie diet were significantly more prevalent in PCOS cases ($p=0.02$ and $p=0.01$, respectively). PCOS women showed higher rates of obesity (47.2%), hyperandrogenism (Ferriman-Gallwey ≥8 in 87.8%), acne, and alopecia ($p<0.001$). Hormonal and metabolic profiles indicated elevated serum testosterone, DHEA, fasting blood sugar, and HbA1c levels in PCOS participants ($p<0.05$), suggesting increased insulin resistance.

Conclusion: PCOS is highly prevalent among reproductive-age women in Misan and is strongly linked to modifiable lifestyle and metabolic risk factors. Early detection and lifestyle interventions are essential. Public health initiatives should prioritize awareness, dietary counselling, physical activity promotion, and routine metabolic screening to manage and reduce PCOS-related complications.

Keywords: Polycystic Ovary Syndrome, Hyperandrogenism, Insulin Resistance, Obesity, Lifestyle Factors, Rotterdam Criteria

INTRODUCTION

Polycystic Ovary Syndrome (PCOS) is a common endocrine disorder affecting women of reproductive age worldwide. It is characterized by ovulatory dysfunction, hyperandrogenism, and polycystic ovarian morphology, leading to menstrual irregularities, infertility, metabolic disturbances, and an increased risk of long-term complications such as type 2 diabetes, cardiovascular diseases, and endometrial hyperplasia. PCOS is a significant public health concern due to its high prevalence and complex pathophysiology, which involves genetic, environmental, and lifestyle factors. Although it affects women globally, the prevalence and clinical presentation of PCOS vary across different populations, influenced by genetic predisposition, lifestyle habits, and healthcare access [1].

In Middle Eastern countries, including Iraq, studies suggest a higher prevalence of PCOS compared to Western populations, likely due to genetic factors, dietary habits, and higher rates of obesity and insulin resistance. Despite the increasing awareness of PCOS in Iraq, comprehensive national studies assessing its prevalence, risk factors, and associated metabolic complications remain scarce [2].

Most clinical guidelines recognize the diagnosis of Polycystic Ovary Syndrome (PCOS) when a patient meets two out of three criteria, which include chronic anovulation, clinical or biochemical hyperandrogenism, and polycystic ovarian morphology, provided that other potential causes have been excluded. These diagnostic criteria are based on the widely accepted Rotterdam Criteria [3].

Several risk factors contribute to the development and progression of PCOS among Iraqi women. Genetic predisposition plays a crucial role, as women with a family history of PCOS or metabolic disorders are more likely to develop the condition. Additionally, obesity and insulin resistance, which are highly prevalent in Iraq due to dietary patterns rich in carbohydrates and low physical activity levels, exacerbate hormonal imbalances in PCOS. Environmental factors, including exposure to endocrine-disrupting chemicals (EDCs) and stress, may also contribute to the increased burden of PCOS. The interplay between socioeconomic status, lifestyle choices, and cultural influences further shapes the epidemiological patterns of PCOS in Iraq [4, 5].

The health implications of PCOS extend beyond reproductive issues, affecting metabolic, cardiovascular, and psychological well-being. Women with PCOS face an increased risk of diabetes, dyslipidemia, hypertension, and mental health disorders such as depression and anxiety. However, underdiagnosis and delayed treatment remain major challenges, particularly in rural and underserved areas with limited access to specialized gynecological and endocrinological care. Public health initiatives aimed at increasing awareness, early screening programs, and lifestyle interventions are essential to address the growing burden of PCOS in Iraq [6, 7].

This study aimed to estimate the prevalence of PCOS among women in Misan Province based on Rotterdam criteria and to explore clinical features, lifestyle and dietary habits contributing to PCOS development, and to evaluate the association between PCOS and metabolic conditions such as obesity and diabetes.

METHODS

A cross-sectional study was conducted to estimate the prevalence of PCOS among women aged 18-45 years attending the gynecology outpatient clinics in Misan city, for the duration from 1st of January 2024 till 1st of December 2024.

Two hundred women aged 18–45 years who presented with cycle irregularities and features of hyperandrogenism were included in the study. Women who were already on hormonal therapy, pregnant and breastfeeding women, and those diagnosed with other endocrine disorders (thyroid dysfunction and hyperprolactinemia) were excluded.

Data was collected from each patient and covered the following aspects: sociodemographic information: age, residency, marital status and socioeconomic status. The menstrual history: cycle regularity, duration, frequency, and presence of intermenstrual bleeding. Assessment of lifestyle and dietary habits: physical activity levels, diet patterns, and smoking status. Past medical and drug history. Signs of PCOS include hirsutism, acne and alopecia.

The clinical examination for the following aspects: measurement of height and weight for BMI calculation. Waist-to-hip ratio assessment by measuring the waist and hip circumferences.

Assessment of hirsutism according to the Ferriman-Gallwey scoring system. Blood samples were collected after overnight fasting for serum testosterone, DHEA level, fasting blood glucose and HBA1C. Pelvic ultrasound to identify polycystic ovarian morphology (12 or more follicles of 2–9 mm diameter in each ovary and/or ovarian volume >10 cm^3).

Women were diagnosed with PCOS based on the Rotterdam criteria, which require at least two of the following three criteria: oligo or anovulation, clinical or biochemical signs of hyperandrogenism and polycystic ovaries on ultrasound, after the exclusion of other endocrine disorders.

Written informed consent was obtained from all participants after explaining the purpose and procedures of the study. Confidentiality and anonymity of participants were ensured throughout the study.

Data were analyzed using statistical software SPSS version 26. Descriptive statistics were used to summarize the data, including frequencies and percentages for categorical variables and mean ± standard deviation for continuous variables.

RESULTS

The study included 200 women. The mean age of participants was 27.6 ± 6.4 years. Among the participants, 54.0% were urban residents. Regarding marital status, 62.5% of participants were married, while 37.5% were single. Socioeconomic status was predominantly middle (56.0%), with fewer participants reporting low (34.5%) or high (9.5%) socioeconomic levels.

Table 1: Demographic and Socioeconomic Characteristics of Participants

Variables		No. (%)
Age	Mean ± SD	27.6 ± 6.4
Residency	Rural	92 (46.0)
	Urban	108 (54.0)
Marital status	Single	75 (37.5)
	Married	125 (62.5)
Socioeconomic status	Low	69 (34.5)
	Middle	112 (56.0)
	High	19 (9.5)

A sedentary lifestyle was notably higher in women with PCOS (73.1%) compared to non-PCOS participants (51.9%) (p=0.02). Moderate and active physical activity levels were less common in the PCOS group. High-calorie diets were significantly more prevalent in the PCOS group (69.1% vs. 45.5%, p=0.01), whereas balanced and low-calorie diets were more common in non-PCOS participants. Smoking status did not show a statistically significant difference between groups, with similar distributions of smokers and non-smokers. (Table 2).

Table 2: Physical Activity, Dietary Patterns, and Smoking Status

Variables		PCOS (n=123)	Non PCOS (n=77)	P-VALUE
Physical activity	Sedentary	90 (73.1)	40 (51.9)	0.02
	Moderate	20 (16.3)	20 (25.9)	
	Active	13 (10.6)	17 (22.2)	
Diet pattern	High calorie	85 (69.1)	35 (45.5)	0.01
	Balanced	45 (36.6)	35 (45.5)	
	Low calorie	3 (2.4)	7 (9.1)	
Smoking status	Smoker	20 (16.3)	10 (12.9)	0.14
	Non-smoker	103 (83.7)	67 (87.1)	

Signs of hyperandrogenism, measured by the Ferriman-Gallwey score, were significantly higher in women with PCOS. Among PCOS participants, 87.8% had scores >8, compared to only 15.6% in the non-PCOS group (p<0.001). Acne and alopecia were more prevalent in the PCOS group (61.0% and 36.6%, respectively), further indicating clinical manifestations of the syndrome.

Anthropometric measurements revealed significant differences in BMI, waist circumference, hip circumference, and waist-to-hip ratio. Obesity was more prevalent among PCOS women (47.2% vs. 15.6%, p=0.002), with a mean waist circumference of 92.3 ± 9.1 cm in the PCOS group compared to 84.2 ± 7.4 cm in the non-PCOS group (p<0.001). Similarly, hip circumference and waist-to-hip ratio were significantly higher in the PCOS group. (Table 3)

Table 3: Clinical Signs of PCOS and Anthropometric Measurements

Signs of PCOS		PCOS (n=123)	Non PCOS (n=77)	P-VALUE
Ferriman-Gallwey	<8	15 (12.2)	65 (84.4)	<0.001
	≥8	108 (87.8)	12 (15.6)	
Acne	N0. (%)	75 (61.0)	20 (25.9)	<0.001
Alopecia	No. (%)	45 (36.6)	10 (12.9)	0.03
Anthropometric measurements				
BMI	Underweight (<18.5)	5 (4.1)	5 (6.5)	0.002
	Normal (18.5-24.9)	20 (16.3)	40 (51.9)	
	Overweight (25-29.9)	40 (32.4)	20 (25.9)	
	Obese (>30)	58 (47.2)	12 (15.6)	
Waist circumference	mean ± SD	92.3 ± 9.1	84.2 ± 7.4	<0.001
Hip circumference	mean ± SD	102.4 ± 8.5	96.3 ± 3.1	<0.001
Waist to hip ratio	mean ± SD	0.91 ± 0.1	0.87 ± 0.09	<0.001

The hormonal and metabolic profiles of PCOS participants demonstrated significant differences. Serum testosterone levels were markedly elevated in the PCOS group (2.1 ± 0.5 ng/ml) compared to non-PCOS participants (0.8 ± 0.2 ng/ml, p<0.001), indicating hyperandrogenism. DEHA levels followed

a similar trend (2.5 ± 0.6 µg/dL vs. 1.2 ± 0.3 µg/dL, p<0.001).

Fasting blood sugar (FBS) levels were slightly higher in the PCOS group (97.3 ± 12.1 mg/dL vs. 92.4 ± 10.01 mg/dL, p=0.04), while HbA1C levels were significantly elevated in PCOS participants (6.1 ± 0.5% vs. 5.6 ± 0.4%, p=0.001), indicating an increased risk of insulin resistance and metabolic disturbances in PCOS women. (Table 4)

Table 4: Blood Test Results in Non-PCOS and PCOS Groups

Blood tests	PCOS (n = 123)	Non PCOS (n = 77)	P-VALUE
Serum testosterone (ng/ml)	2.1 ± 0.5	0.8 ± 0.2	<0.001
DEHA (µg/dL)	2.5 ± 0.6	1.2 ± 0.3	<0.001
FBS (mg/dL)	97.3 ± 12.1	92.4 ± 10.01	0.04
HBA1C	6.1 ± 0.5	5.6 ± 0.4	0.001

DISCUSSION

This study provides an important snapshot of the This cross-sectional study aimed to estimate the prevalence and characteristics of polycystic ovary syndrome (PCOS) among reproductive-age women presenting with cycle irregularities and hyperandrogenism in Misan city. The findings highlight significant associations between PCOS and a range of demographic, lifestyle, clinical, and biochemical variables, many of which are consistent with global evidence.

As shown in Table 1, most participants were young women in their late twenties, predominantly urban residents and of middle socioeconomic status. These demographics reflect the broader pattern reported in similar regional studies where urbanization and lifestyle factors have been linked to rising PCOS rates due to dietary shifts and reduced physical activity as reported by Sharma et al. (2025) [8].

Table 2 illustrates a strong association between PCOS and sedentary lifestyle (73.1% vs. 51.9%, p=0.02), as well as high-calorie diets (69.1% vs. 45.5%, p=0.01). These findings align with international literature identifying lifestyle factors as key contributors to PCOS pathogenesis by promoting insulin resistance and obesity as reported by Sedighi et al. (2014) [9]. Interestingly, smoking did not differ significantly between groups, which is consistent with reports by Pau et al. (2013) [10] suggesting that smoking may not directly influence PCOS risk but may exacerbate metabolic complications once the syndrome is established.

Clinical signs of hyperandrogenism were significantly more prevalent among PCOS participants, as demonstrated in Table 3. Over 87% of women with PCOS had Ferriman-Gallwey scores ≥8 (p<0.001), and acne and alopecia were also markedly more frequent. These results mirror diagnostic patterns in studies from Iraq, Egypt, and India, supporting the validity of clinical signs as reliable indicators of hyperandrogenism in PCOS diagnosis as per Rasool et al. (2021) and Amiri et al. (2017) [11, 12]. Additionally, PCOS participants had significantly higher rates of overweight and obesity, as well as greater waist-to-hip ratios. These anthropometric differences are critical, as abdominal obesity is strongly linked with insulin resistance and hormonal imbalance, key components of PCOS pathophysiology as reported by Zhang et al. (2023) [13].

Biochemical analysis (Table 4) further supported the diagnosis of PCOS, with significantly elevated serum testosterone and DHEA levels (p<0.001), in line with the Rotterdam criteria and consistent with prior research indicating hyperandrogenaemia in up to 80% of PCOS cases [14]. Fasting blood glucose and HbA1c levels were also significantly higher among PCOS women (p=0.04 and p=0.001, respectively), suggesting a higher risk of insulin resistance and metabolic syndrome—an association well-established in the literature [15]. Elevated HbA1c in particular is a concerning marker for prediabetes and long-term cardiovascular risk in PCOS populations as found by de Medeiros et al. (2014) [16].

Taken together, the findings of this study reinforce the multifactorial nature of PCOS, where lifestyle, hormonal, and metabolic elements interact to shape disease presentation. The consistency with regional and international literature underlines the need for early screening, lifestyle intervention, and metabolic monitoring in women with PCOS. These data also emphasize the importance of community-based

awareness and health education campaigns targeting modifiable risk factors.

This study was limited by its cross-sectional design, which prevents establishing causal relationships. The sample was restricted to women attending gynecology clinics, which may not reflect the general population. Additionally, self-reported lifestyle data may be subject to recall or reporting bias.

CONCLUSION AND RECOMMENDATIONS

This study highlights a high prevalence of PCOS among reproductive-age women in Misan city, with strong associations observed between PCOS and sedentary lifestyle, high-calorie diets, obesity, and biochemical markers of hyperandrogenism and insulin resistance. Clinical signs such as hirsutism, acne, and alopecia were significantly more common among affected women, underscoring the importance of early identification and management. The findings reinforce the multifactorial nature of PCOS and its links to lifestyle and metabolic factors.

It is recommended to implement targeted awareness programs promoting healthy lifestyle habits among women of reproductive age. Routine screening for metabolic complications should be integrated into PCOS management protocols. Further longitudinal studies are encouraged to explore causal relationships and the long-term impact of interventions.

Conflicts of Interests: None

Funding: No funding body was involved in this study.

Ethical Approvals: Ethical approval for the study was obtained from the relevant institutional review board, and informed consent was acquired from all participants prior to their inclusion in the study.

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