



Original Research Article

Frequency of Polycystic Ovarian Syndrome in Infertile Women Presenting at Mardan Medical Complex

Article History:

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Abstract: **Objective:** To determine the frequency of polycystic ovarian syndrome among infertile women presenting at a tertiary care hospital. **Study Design:** Descriptive cross-sectional study. **Place and Duration of Study:** This study was conducted from 13th May 2025 to 13th September 2025 at the Department of Obstetrics and Gynecology Mardan Medical Complex Mardan. **Methodology:** A total of 146 infertile women aged 18 to 40 years were enrolled. Polycystic ovarian syndrome was diagnosed on the basis of established clinical and ultrasonographic criteria. Data were entered and analyzed using Statistical Package for Social Sciences version twenty-seven. Chi-square test were applied after stratification and a P value less than 0.05 was taken as statistically significant. **Results:** The mean age of participants was 28.55 ± 6.44 years and mean body mass index was 27.08 ± 2.75 kilogram per meter square. Polycystic ovarian syndrome was found in 89 women giving a frequency of 61%. Significant association was observed with age more than thirty years ($P = 0.045$), body mass index greater than twenty-five kilograms per meter square ($P = 0.001$), and diabetes mellitus ($P = 0.048$). **Conclusion:** Polycystic ovarian syndrome is highly frequent among infertile women and is significantly associated with increasing age, raised body mass index and diabetes.

Keywords: Body mass index; Female infertility; Polycystic ovary syndrome; Reproductive health; Risk factors

INTRODUCTION

Infertility is a common problem among women. It has been defined as the inability to conceive after regular unprotected sexual intercourse for a given period, usually a year.¹ This condition has been a major medical and social problem due to its potential to cause emotional distress, psychological upsets, and social pressures on women and their partners.² Female infertility can result from ovulation disorders, hormonal imbalances, uterine anomalies, and tubal blockage.³ The exact cause of infertility, however, can be difficult to identify. It can be the result of a combination of factors, including age, lifestyle, and medical problems.⁴

Infertility among women is caused by a variety of factors that are mostly complex, combining physiological and environmental factors.⁵ Disorders

of ovulation represent a very common cause of female infertility, defined by ovulation failure to discharge a mature ovum on a regular basis, which presents with irregular or absent menstrual cycles.⁶ Hormonal disorders, such as an imbalance of estrogen, progesterone, luteinizing hormone, and follicle-stimulating hormone, can interfere with normal reproductive cycles.⁷ Other factors that lead to female infertility include endometriosis, pelvic inflammatory disease, uterine fibroids, and anatomical abnormalities of the reproductive system.⁸

Polycystic ovary syndrome (PCOS) is one of the most common endocrine disorders seen in infertile women, which is associated with anovulation, hyperandrogenism, and polycystic ovarian morphology.⁹ PCOS sufferers often experience

irregular menstrual cycles, hirsutism, acne, and decreased fertility.¹⁰ Although the exact cause of PCOS is not well understood, this disorder is clearly related to insulin resistance and hormone imbalances, particularly an increase in androgens.¹¹ PCOS impacts ovarian function, causing anovulation or impaired follicular development which is associated with decreased fertility. PCOS is also associated with metabolic problems, including obesity, diabetes, and cardiovascular disease, which further contribute to fertility problems.¹² A study reported the frequency of polycystic ovarian syndrome in infertile women was 58.7%.¹³

There is a strong need to carry out this research in Mardan, considering that infertility is a pressing health issue that is surfacing as a significant health problem among women, with little information on its etiologies and patterns in this region. Polycystic ovarian syndrome is a common condition that is often seen in infertile women, though little is known about this condition in this region. Cultural factors, delayed health care-seeking behaviors, and lack of knowledge may further worsen health outcomes for women in this region. Therefore, this study was carried out to determine the burden of polycystic ovarian syndrome among infertile women.

METHODOLOGY

This cross-sectional study was carried out in the Department of Obstetrics and Gynecology Mardan Medical Complex, Mardan. The study duration was from 13th May 2025 to 13th September 2025. Ethical permission was obtained from the ethical review committee of Mardan Medical Complex as well as from the research department of CPSP Karachi. The study was conducted according to institutional rules and confidentiality of the participants was maintained throughout the research process. The sample size was calculated by using WHO sample size calculator. The calculation was done by taking the frequency of polycystic ovarian syndrome in infertile women as 58.7%,¹³ margin of error as 8%, and confidence level as 95%. The total calculated sample

size came out to be 146. Females aged between 18 and 40 years who were identified as infertile were included in the study. Infertility was considered as failure to conceive after 12 months of regular unprotected intercourse in women younger than 35 years or after 6 months in women aged 35 years or above. Females having severe obesity, thyroid disorders, history of recent pelvic or abdominal surgery, or recent use of hormonal contraceptives or intrauterine devices were excluded from the study. After explaining the purpose and benefits of the study written informed consent was taken from all participants before data collection. Participants were assured that there was no risk involved in their participation and that their information would remain confidential.

Demographic information including age, BMI, education status, socio economic status and place of residence was recorded. Comorbid conditions such as diabetes and hypertension were also noted. A detailed history was taken and clinical examination was performed in all enrolled women. Women were screened for polycystic ovarian syndrome (PCOS) according to the established diagnostic criteria. This included a woman's menstrual history, signs and symptoms of hormonal imbalance, and ultrasound examination of the ovaries. PCOS was defined as the presence of at least two of the following: irregular or absent menstrual cycles, signs and symptoms of hyperandrogenism such as hirsutism, acne, and/or alopecia, and ultrasound evidence of polycystic ovaries, defined as the presence of 12 or more follicles measuring 2-9 mm in diameter and/or an ovarian volume greater than 10 mL.

Data were entered and analyzed using SPSS version 27. Frequencies and percentages were calculated for categorical variables. Mean + SD was calculated for variables such as age, height, weight and BMI. PCOS was stratified with respect to age, BMI, diabetes, hypertension, education status, socio economic status and place of living. Post-stratification chi square test was applied and p-value <0.05 was taken as statistically significant.

RESULTS

The demographic characteristics of study participants was presented showing mean age was 28.55 ± 6.44 years, mean weight was recorded as 67.11 ± 7.49 kg, mean height was 1.57 ± 0.05 m and mean BMI was 27.08 ± 2.75 kg/m². Regarding socioeconomic status distribution, majority of patients belongs to middle class 64 (43.8%) followed by lower class 57 (39.0%) and upper class 25 (17.1%). The place of living analysis revealed that 84 (57.5%) patients were from rural areas while 62 (42.5%) was from urban areas. Education status data indicated that 77 (52.7%) patients was illiterate and 69 (47.3%) was literate. Employment status showed that most participants 119 (81.5%) was unemployed while only 27 (18.5%) was employed. Regarding comorbidities, diabetes was present in 33 (22.6%) patients and absent in 113 (77.4%) patients, while hypertension was found in 29 (19.9%) patients and not present in 117 (80.1%) patients (Table 1).

Table 1. Patient Demographics

Demographics	Mean $\pm$ SD / n (%)
Age (years)	28.55 $\pm$ 6.44
Weight (kg)	67.11 $\pm$ 7.49
Height (m)	1.57 $\pm$ 0.05
BMI (kg/m ²)	27.08 $\pm$ 2.75
Socioeconomic Status	
Upper n (%)	25 (17.1%)
Middle n (%)	64 (43.8%)
Lower n (%)	57 (39.0%)
Place of Living	
Urban n (%)	62 (42.5%)
Rural n (%)	84 (57.5%)
Education Status	
Literate n (%)	69 (47.3%)
Illiterate n (%)	77 (52.7%)
Employment	
Employed n (%)	27 (18.5%)
Unemployed n (%)	119 (81.5%)
Diabetes	
Yes n (%)	33 (22.6%)
No n (%)	113 (77.4%)
Hypertension	
Yes n (%)	29 (19.9%)
No n (%)	117 (80.1%)

The frequency analysis demonstrated that PCOS was diagnosed in 89 (61%) of infertile women while 57 (39%) patients did not have PCOS out of total 146 patients (Table 2).

Table 2. Frequency of Polycystic Ovarian Syndrome in Infertile Women

PCOS	Frequency	%age
Yes	89	61%
No	57	39%
Total	146	100%

Age stratification showed that PCOS was present in 51 (54.8%) patients ≤ 30 years and 38 (71.7%) patients > 30 years with significant p-value of 0.045. BMI analysis indicated PCOS in 16 (40.0%) patients with BMI ≤ 25 kg/m² and 73 (68.9%) patients with BMI > 25 kg/m² with highly significant p-value of 0.001. Socioeconomic status showed PCOS in 18 (72.0%) upper class, 35 (54.7%) middle class, and 36 (63.2%) lower class patients with non-significant p-value of 0.293. Place of living revealed PCOS in 40 (64.5%) urban and 49 (58.3%) rural patients with p-value of 0.449. Education status showed PCOS in 45 (65.2%) literate and 44 (57.1%) illiterate patients with p-value of 0.318. Employment status demonstrated PCOS in 15 (55.6%) employed and 74 (62.2%) unemployed patients with p-value of 0.524. Diabetes association showed PCOS in 25 (75.8%) diabetic patients compared to 64 (56.6%) non-diabetic patients with significant p-value of 0.048. Hypertension analysis revealed PCOS in 21 (72.4%) hypertensive and 68 (58.1%) non-hypertensive patients with p-value of 0.158 (Table 3).

Table 3. Association of PCOS with Demographic Factors

Demographic Factors		PCOS		p-value*
		Yes n(%)	No n(%)	
Age (years)	≤ 30	51 (54.8%)	42 (45.2%)	0.045
	> 30	38 (71.7%)	15 (28.3%)	
BMI (Kg/m ²)	≤ 25	16 (40.0%)	24 (60.0%)	0.001
	> 25	73 (68.9%)	33 (31.1%)	
Socioeconomic Status	Upper	18 (72.0%)	7 (28.0%)	0.293
	Middle	35 (54.7%)	29 (45.3%)	
	Lower	36 (63.2%)	21 (36.8%)	
Place of Living	Urban	40 (64.5%)	22 (35.5%)	0.449
	Rural	49 (58.3%)	35 (41.7%)	

Education Status	Literate	45 (65.2%)	24 (34.8%)	0.318
	Illiterate	44 (57.1%)	33 (42.9%)	
Employment	Employed	15 (55.6%)	12 (44.4%)	0.524
	Unemployed	74 (62.2%)	45 (37.8%)	
Diabetes	Yes	25 (75.8%)	8 (24.2%)	0.048
	No	64 (56.6%)	49 (43.4%)	
Hypertension	Yes	21 (72.4%)	8 (27.6%)	0.158
	No	68 (58.1%)	49 (41.9%)	

*Chi-square Test

DISCUSSION

The findings of this study revealed that PCOS was present in 89 (61%) of infertile women which indicates high prevalence of this condition among infertile population. This high frequency can be attributed to fact that PCOS is one of most common endocrine disorder affecting women of reproductive age and it directly interferes with ovulation process leading to anovulation or irregular ovulation which ultimately results in infertility. The study demonstrated significant association between age and PCOS with higher prevalence 38 (71.7%) in patients >30 years compared to 51 (54.8%) in patients ≤30 years with p-value of 0.045. This finding suggests that increasing age may worsen hormonal imbalances and metabolic disturbances associated with PCOS, as prolonged exposure to hyperandrogenism and insulin resistance tends to accumulate with advancing age leading to more pronounced manifestations of syndrome. BMI showed highly significant association with PCOS as 73 (68.9%) patients with BMI >25 kg/m² had PCOS compared to only 16 (40.0%) patients with BMI ≤25 kg/m² with p-value of 0.001. The high level of association can be explained through the mechanism whereby obesity results in insulin resistance, leading to hyperinsulinemia. This results in the production of ovarian androgen hormones while simultaneously decreasing sex hormone-binding globulin (SHBG) levels, thus increasing free testosterone levels in the body and worsening PCOS symptoms. The association between diabetes and PCOS was highly significant, whereby 25 (75.8%) out of 64 diabetic patients had PCOS compared to 64 (56.6%) out of 113 non-diabetic patients (p = 0.048). This can be explained through the pathophysiological mechanism whereby insulin resistance results in hyperglycemia while simultaneously affecting ovarian function through hyperandrogenism and irregular menstrual cycles, thus causing PCOS, a condition that results in infertility in women. The frequency of PCOS in infertile women was found to be 89 (61%) in present study which is comparable to findings of Patil et al. 14 who reported 54.9% prevalence among infertile women but higher than Eleawi et al. 15 who found 29.0% (174/600), Oriji et al. 16 who reported 16.7% (29/174), Haq et al. 17 who found 17.6% (508/2884), and Hanifa et al. 18 who reported 49.5% (92/186). This variation in

frequencies can be attributed to differences in diagnostic criteria used, study population characteristics, and geographic variations in prevalence of metabolic disorders. However, all studies confirm that PCOS remains major contributor to infertility affecting significant proportion of women seeking fertility treatment. Present study showed significant association between age >30 years and PCOS with 38 (71.7%) patients having PCOS compared to 51 (54.8%) in patients ≤30 years (p=0.045) which contradicts findings of Eleawi et al. 15 who reported higher prevalence in younger age group 20-29 years with 55.2% (96/174) and Hanifa et al. 18 who found no significant association between age and PCOS (p=1.000). This discrepancy may be explained by fact that in some populations younger women presents earlier for infertility evaluation while in other settings older women with prolonged exposure to metabolic dysfunction develops more pronounced PCOS manifestations leading to infertility at later age. The present study demonstrated highly significant association between BMI >25 kg/m² and PCOS with 73 (68.9%) patients having PCOS compared to 16 (40.0%) in patients with BMI ≤25 kg/m² (p=0.001) which is consistent with findings of Oriji et al. 16 who reported BMI >25 in 90% of PCOS women compared to 72% in women with normal ovaries, Haq et al. 17 who found obesity rate of 68.5% with 39.7% having BMI 25-29.9 and 28.8% having BMI >30, and Patil et al. 14 who reported mean BMI of 27.24±2 with 28.57% (16/56) having BMI 26-30 kg/m² and 19.6% (11/56) having BMI 31-35 kg/m². However, Hanifa et al. 18 found no significant association between BMI and PCOS (p=0.557). The strong association between obesity and PCOS in most studies supports pathophysiological mechanism where excess adipose tissue promotes insulin resistance and hyperinsulinemia which triggers ovarian hyperandrogenism and anovulation. The present study found significant association between diabetes and PCOS with 25 (75.8%) diabetic patients having PCOS compared to 64 (56.6%) non-diabetic patients (p=0.048) which aligns with findings of Haq et al. 17 who reported abnormal insulin levels in 59% of PCOS patients and family history of diabetes in 54% cases. However, Eleawi et al. 15 reported lower prevalence of diabetes mellitus in PCOS cases with only 2.3% (4/174) compared to 1.4% (6/426) in non-PCOS group. This difference may be related to different

diagnostic criteria for diabetes or different stages of disease progression in study populations where some patients may have insulin resistance without overt diabetes while others already developed clinical diabetes.

The limitations of the current study are discussed below. The current study has a limitation because it was conducted at a single center. This might limit the study's representation of the entire infertile community because the characteristics and patterns of patients attending different healthcare settings might differ. Secondly, the current study was based on a small sample size, with only 146 participants. This might have limited the representation of the entire infertile community. Thirdly, the current study design was a cross-sectional study. This limitation meant that the current study was not able to examine the longitudinal associations between PCOS and other factors.

CONCLUSION

The study concluded that the prevalence of polycystic ovarian syndrome (PCOS) is high among infertile women and is a major factor of female infertility. The study revealed that PCOS is associated with increasing age and high body mass index. This implies that metabolic factors are important in the development and progression of PCOS.

Disclaimer:

Nothing to declare.

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Ethical Permission:

Permission for this research was taken from the ethical board. All step of the study was done by following committee instruction and rule of Helsinki Declaration.

Patient Consent:

Consent in written form was taken from all patient before study start. Patient were informed that their data will be confidential and they were free to stop participation whenever they want.

Conflict of Interest:

Author confirm there is no personal or financial conflict related to this research.

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