

IMPACT OF CLINICAL FEATURES ON QUALITY OF LIFE IN WOMEN WITH POLYCYSTIC OVARIAN SYNDROME

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Received: 02 March 2025, Revised and Accepted: 15 April 2025

ABSTRACT

Objectives: The primary objective of the study focuses on measuring the quality of life (QoL) in the study population using the polycystic ovarian syndrome questionnaire (PCOSQ). The secondary objective is to assess and correlate the impact of clinical features presented in affected women on QoL.

Methods: A prospective, cross-sectional study was conducted involving 354 patients diagnosed with the syndrome. Clinical symptoms, demographic features, and QoL indicators were noted and evaluated using patient case history and PCOSQ. Statistical analyses such as analysis of variance, the Kruskal-Wallis test, and multiple regression statistics were conducted to evaluate the effect of clinical factors on QoL domains.

Results: Five domains of health-related QoL (HRQoL) were assessed, signifying reduced QoL among the affected population. Hirsutism had the greatest impact on the study population (5.88±1.38). Emotional well-being was notably affected, with a moderate mean score of 4.34±1.30, influenced by hormonal imbalances and reproductive concerns that contributed to psychological distress. Weight issues (5.18±1.95) were positively correlated with acne severity ($\beta=0.010$, $p<0.05$), and menstrual distress (4.44±1.23) showed a negative association with body mass index ($\beta=-0.018$, $p<0.05$). Both weight concerns and menstrual irregularities contributed to reduced self-esteem and overall health of women. Evaluation of HRQoL across four phenotypes reported that phenotype A exhibited the poorest QoL across all the domains ($p<0.05$).

Conclusion: PCOS is a multifactorial disease that impairs the QoL in affected women. The study results emphasize the need for targeted management, therapeutic and non-pharmacological, for improving the patient's overall well-being.

Keywords: Polycystic ovarian syndrome, Quality of life, Infertility, Menstrual irregularities, Hyperandrogenism, Polycystic ovarian syndrome questionnaire.

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INTRODUCTION

Polycystic ovarian syndrome (PCOS) is a metabolic disorder that affects the reproductive organs of women. The rate of prevalence varies based on ethnicity, diagnostic criteria, genetic polymorphism, and other environmental factors such as education, stress, work life, and lifestyle changes. The global prevalence rate reflects a range of 5% and 20% [1-7]. Clinical manifestations of affected women include menstrual irregularities, hyperandrogenism (HA), and multiple cysts or follicles in the ovary [2-7]. Psychological distress and infertility were found in the women. It is treated as a leading condition that causes infertility due to altered ovarian morphology, hormonal disturbances, and endometrial changes [8]. As a metabolic disorder, it is associated with dyslipidemia, weight issues, glucose intolerance, cardiovascular diseases, and even cancers, particularly endometrial or ovarian cancer [9].

The etiology of the syndrome remains multifactorial and complex. However, hyperinsulinemia and insulin resistance were identified as the key factors involved in the pathophysiology of the disease due to hyperandrogenic secretions from thecal cells of the ovary [10,11]. This underlying mechanism has led to manifest symptoms such as acne, hirsutism, and alopecia in affected women. Furthermore, increased values of luteinizing hormone (LH) and altered secretions of gonadotrophin-releasing hormone (GnRH) often lead to disruptive folliculogenesis, further resulting in the formation of fluid-filled follicles or cysts and ovulatory dysfunction (OD). Changes in GnRH result in LH surge over follicle-stimulating hormone [11].

Women suffering from PCOS often exhibit psychological and emotional concerns, such as anxiety, depression, and negative self-perception, which causes an impact on overall health-related quality of life (HRQoL) [12-14]. Many studies conducted worldwide and in India suggest that overweight, obesity, acne, hirsutism, and infertility issues would further worsen the quality of life (QoL) in affected women. Factors such as menstrual irregularities, chronic health concerns, and dissatisfaction with the treatment outcomes have exacerbated the emotional distress caused in the women.

Lifestyle management is the main intervention suggested in the syndrome, which includes diet alterations, exercise, yoga, and stress therapy, which would improve the condition as well as the QoL in women. Pharmacological intervention in affected women includes hormonal therapy, anti-androgens, insulin-sensitizing agents, and vitamins [11]. However, many women experience the side effects of the therapy, which would further affect the prescription adherence rate [15] and psychological well-being of the individual.

PCOS being a prevalent disorder, the syndrome remains an under-reported and under-treated condition affecting women's health. With an increase in the burden of disease and its comorbidities, the woman requires early detection and proper initial treatment. Hence, the current study focuses on measuring the impact of HRQoL on clinical domains of PCOS. Furthermore, knowledge of issues raised in PCOS women would also help in designing a personalized treatment. Both pharmacological and non-pharmacological, thereby aiming for the best possible outcomes.

METHODS

Study design and ethical consideration

The prospective, cross-sectional study was done in the gynecology department of Bhimavaram Hospitals in an outpatient setup from July 2019 to December 2023. The study was approved by the Institutional Ethics Committee (IEC Ref No: VDC/IEC/fac/2018/14), all the participants were prior informed about the study objectives, and consent was obtained before enrollment. Participants were selected through a convenience sampling technique, and the study was conducted by following the principles of the Declaration of Helsinki. Confidentiality and anonymity were maintained throughout the study.

Study population

A total of 354 women were selected for the study based on inclusion and exclusion criteria.

Exclusion criteria

- Women older than 45 years or those with menopause-related amenorrhea
- Patients with primary hypothyroidism, premature ovarian failure, adrenal hyperplasia, or androgen-secreting tumors
- Pregnant and lactating mothers
- Women who are unwilling to take part in the study.

Inclusion criteria

- Women aged 12–40 years
- Rotterdam criteria are used to assess and categorize patients with PCOS. Affected women should have at least two of the following characteristics: Oligo or anovulation (OD), clinical or biochemical signs of HA, and the presence of cystic ovaries or multiple follicles on ultrasound.

Further classify PCOS women into phenotypes with phenotype A indicating HA, OD, and polycystic ovarian morphology (PCOM); phenotype B means HA and OD; phenotype C is HA and PCOM; phenotype D (non-androgenic) means having OD and PCOM.

Data collection

Data were collected from patients' case sheets, and a self-designed questionnaire was used to identify case history. Demographics such as age, weight, menstrual history, and clinical symptoms such as acne, alopecia, excessive hair, bleeding issues, and irregularities in the menstrual cycle were noted. Body mass index (BMI) was calculated using patient height and weight, and they were categorized into different groups as per World Health Organization standard guidelines underweight ($<18 \text{ kg/m}^2$), normal weight (ranging between 18 and 24.9 kg/m^2), overweight (between 25 and 29.9 kg/m^2) and obese groups (above 40 kg/m^2). PCOS questionnaire (PCOSQ) is used as an instrument to measure the QoL in women. It consists of 26 items, which are majorly divided into five domains: Emotional, body hair issues, weight concerns, infertility, and menstrual irregularities [16]. Scores were given on a 7-point scale for all 26 questions, in which 7 represents the good level of functioning, whereas 1 indicates the poorest level. The lowest scores indicate the adverse impact on women's overall well-being.

Statistical analysis

Data analysis is executed using Statistical Packages for the Social Sciences version 22.0. Summary and descriptive statistics were expressed as average/mean and standard deviation. Categorical variables were assigned in terms of frequency and percentage. One-way analysis of variance is applied to compare PCOSQ domain scores across four phenotypes (A, B, C, and D) for normally distributed variables, while for non-Gaussian distributed variables, the Kruskal-Wallis test was used. Multiple regression analysis was performed among PCOSQ domain scores and clinical predictors. Standardized β coefficients were used to assess the strength and direction of associations. The level of significance is measured at $*p<0.05$, $**p<0.01$. Negative integers in the result indicate inverse relationships, and positive β values indicate

direct associations. The chi-square test is used to assess the association of qualitative variables across PCOS phenotypes.

RESULTS

A total of 354 women were diagnosed with PCOS. Of the diagnosed women, the majority of 218 (61.6%) belonged to the age group of 21–30 years with a mean age of 26.84 ± 5.61 years. Most of the patients were married, 312 (88.1%), and the rest of the participants, 42 (11.9%) were unmarried. Out of 354, it is noted that 224 (63.3%) of the study group finished a higher level of education, whereas the remaining 22% completed secondary education and 14.7% discontinued their education at the primary level. BMI analysis revealed that 47.2% of women were overweight or obese.

Hormonal disturbances were observed with prevalent menstrual irregularities in the study group. Oligomenorrhea was reported in 42.4%, whereas 21.2% expressed amenorrhea signifying OD as a key symptom in PCOS. However, some of the women (19.2%) experienced normal cycles; dysmenorrhea and menorrhagia were seen in 15.3% and 10.7%, respectively. HA is another main characteristic feature of PCOS. In the study, the clinical signs of acne and hirsutism were used to identify excess androgen secretions. Hirsutism was seen in 192 (54.2%) and acne in 204 (57.6%). Infertility is the major concern reported in 90% of married women (Table 1).

PCOSQ scores across five domains statistically assess the impact of PCOS features on the overall well-being of a person. The mean emotional score was 4.34 ± 1.30 , which is moderate. It is influenced by menstrual irregularity and age, suggesting that prolonged cycle irregularities and increasing age would worsen the QoL of women. Hirsutism was observed to have a high impact on QoL, with a score of 5.88 ± 1.38 , indicating it is the major concern in PCOS. However, its negative link with BMI indicates that higher BMI may have reduced body hair issues, potentially due to hormonal changes in obesity. The mean score of weight is 5.18 ± 1.95 , and it is also noted that weight concerns are affected by acne severity ($+0.010^*$). Infertility problem was seen at a mean of 4.09 ± 2.31 , which was negatively affected by acne severity, emphasizing a link between acne and reproductive concerns. Finally, menstrual irregularities (mean= 4.44 ± 1.23) were significantly associated with BMI at -0.018^* , confirming the metabolic issues' contribution to menstrual-related distress (Table 2).

Table 3 reveals significant differences across all five QoL domains, such as emotions, body hair, weight, infertility, and menstrual irregularity

Table 1: Demographic and clinical manifestations of PCOS

Variable	Category	n (354)	Percentage
Age (years)	≤ 20	48	13.6
	21–30	218	61.6
	31–40	80	22.6
	≥ 40	8	2.2
Marital status	Married	312	88.1
	Unmarried	42	11.9
Education level	Primary	52	14.7
	Secondary	78	22.0
	Graduate	168	47.5
	Postgraduate	56	15.8
BMI (kg/m^2)	Underweight (<18.5)	25	7.1
	Normal (18.5 – 24.9)	162	45.8
	Overweight (25 – 29.9)	121	34.2
	Obese (>30)	46	13.0
Menstrual irregularities	Oligomenorrhea	150	42.4
	Amenorrhea	75	21.2
	Dysmenorrhea	54	15.3
	Menorrhagia	38	10.7
PCOS symptoms	Regular cycles	68	19.2
	Hirsutism	192	54.2
	Acne	204	57.6

PCOS: Polycystic ovarian syndrome, BMI: Body mass index

Table 2: Regression analysis of PCOSQ domains to clinical and metabolic predictors in PCOS women (n=354)

PCOSQ domain	Mean±Standard Deviation	95% CI	Hirsutism	BMI	Menstrual irregularity	Acne	Infertility	Age
Emotions	4.34±1.30	4.20–4.47	–0.004	–0.000	0.001	0.002	0.001	0.016*
Body Hair	5.88±1.38	5.73–6.02	–0.043*	–0.039*	0.001	–0.001	–0.000	0.009
Weight	5.18±1.95	4.98–5.38	0.035*	0.034*	–0.001	0.010*	–0.007	–0.014*
Infertility	4.09±2.31	3.84–4.33	0.054*	–0.008	0.000	–0.014*	–0.000	0.017*
Menstrual Problems	4.44±1.23	4.31–4.56	–0.007	–0.018*	0.020*	0.005	–0.005	0.006

PCOSQ: Polycystic ovarian syndrome questionnaire, Multiple regression analysis was performed, and Standardized regression β coefficients values were given;

CI: Confidence interval; *and bolder values indicate significant predictors ($p < 0.05$); Negative β results imply an inverse relationship; Positive β results imply a direct relationship

Table 3: PCOSQ scores in different phenotypes

Phenotype	n (%)	Emotions	Body hair	Weight	Infertility	Menstrual irregularity
A	91 (26)	3.98±1.22**	5.45±1.40*	4.65±1.80	3.70±2.15**	4.10±1.18*
B	26 (7)	4.15±1.18	5.60±1.35	4.80±1.75	3.85±2.10*	4.25±1.20
C	143 (40)	4.45±1.30	6.00±1.25	5.20±1.85	4.30±2.25	4.55±1.15
D	94 (27)	4.60±1.15	6.15±1.10	5.40±1.90	4.60±2.05	4.70±1.05
p-value		<0.001	0.003	0.012	0.001	0.008

PCOSQ: Polycystic ovarian syndrome questionnaire. The one-way analysis of variance was performed to compare PCOSQ domain scores across different phenotypes.

n (%) indicates total no. Of participants in each phenotype (percentage); Phenotype A indicates hyperandrogenism+ovulatory dysfunction+polycystic ovaries;

Phenotype B means hyperandrogenism+ovulatory dysfunction; Phenotype C is hyperandrogenism+polycystic ovaries; Phenotype D (non-androgenic) means ovulatory dysfunction+polycystic ovaries; PCOSQ scores are given as mean±standard deviation; *indicate $p < 0.05$; **indicate $p < 0.01$

among the phenotypes (A, B, C, and D). Across all the domains, phenotype A reported the lowest QoL score, and phenotype D presented the highest score. Emotional well-being ($p < 0.001$) in phenotype A is reported at 3.98±1.22, which signifies higher psychological impact, whereas phenotype D had the highest score at 4.60±1.15 with better emotional health. Hirsutism concern was reported with poor QoL (5.45±1.40) in phenotype A compared to phenotype D (6.15±1.10) at $p = 0.003$. Phenotype A reported greater weight-related distress 4.65±1.80, followed by phenotype B (4.80±1.75). In contrast, phenotype D reported least concern 5.40±1.90 at $p = 0.012$. Regarding infertility, phenotype A had the lowest QoL score (3.70±2.15), indicating significant distress in them, whereas phenotype D had the highest (4.60±2.05). Phenotype A exhibits the highest concern of QoL with menstrual irregularity at a score of 4.10±1.18, whereas phenotype D reflects a better score of 4.70±1.05.

DISCUSSION

Study findings highlight the heterogeneous nature of PCOS, with a strong relation between metabolic, reproductive, and even dermatological symptoms. The majority of the study population (61.6%) belonged to the 21–30 age group, with a mean age of 26.84±5.61 years. Current results align with other studies [6,17,18]. The high prevalence of overweight and obesity in women emphasizes the metabolic disturbances among the study group [19]. Excessive weight can also result in hormonal imbalances leading to menstrual irregularities and HA. Married women mainly visit the clinic for fertility issues. It is also noted that more than half of the population were educated, and their stress and lifestyle patterns could be the trigger. However, uneducated women were found to attend the clinics in later life with more severe symptoms due to less knowledge and awareness [20].

HA, a key characteristic of PCOS, was observed in the study population with clinical signs of hirsutism (53.32%) and acne (56.01%). The obtained results were similar to the findings of Alakananda *et al.* [21], signifying androgen excess as one of the challenging features associated with PCOS. Menstrual disorder is associated with oligomenorrhea and amenorrhea, indicating a progressive decline in menstrual irregularities. Oligomenorrhea is the most prevalent menstrual disturbance identified in the study population; this statement was supported by research conducted by Li *et al.* [22].

The PCOSQ values across clinical characteristics have provided some findings that explain how these concerns significantly affect PCOS

women's well-being. Emotional concern indicates a moderate impact on QoL, which aligns with the study results of Dokras *et al.* [23] who stated that psychological distress in PCOS women is due to irregular cycles, infertility concerns, and metabolic disturbances. Our results suggest that menstrual irregularities and age were the key influencing factors. Prolonged cycle irregularities, along with increasing age, may exacerbate psychological concerns, and these findings were consistent with Himelein and Thatcher [24]. HRQoL scores reveal that hirsutism is a major contributor to poor QoL among suffering women, leading to distress among them, as noted by Guyatt *et al.* and Barnard *et al.* [25,26]. Interestingly, it is observed that there is a negative impact associated with hirsutism and BMI, revealing that increased BMI may lead to reduced hair concerns. The results align with reports given by Barber *et al.* [27], increased adiposity may lead to higher estrogen conversion in adipose, which eventually reduces the androgenic effects on hair growth, due to which we can observe a negative correlation between BMI and hirsutism. However, it does not mean that hair concerns or HA are less in obese women. It may reflect based on self-perception and hormonal compensations.

Weight is another challenging factor that affects the QoL in women. Weight concerns were positively correlated with acne severity, suggesting that women with severe acne face more body dissatisfaction. Study findings align with the results that acne can contribute to self-perception and social distress reported by Alur-Gupta *et al.* [28]. Next, it is found that infertility problems reflect a moderate level of distress in women [29]. However, it is noted in the study women have a negative correlation of infertility with acne severity, which seems to be contrary, but the findings can be interpreted in the context of hormonal variations in PCOS phenotypes, as discussed by Franik *et al.* [30]. Finally, menstrual irregularities significantly impact QoL, with BMI showing a negative correlation. Excess weight can result in insulin resistance and metabolic disturbances, contributing to increased menstrual irregularities. Results are consistent with the existing findings of Moran *et al.* [31].

Our study results reveal a significant difference in the QoL among various phenotypes, with phenotype A (HA+OD+PCOM) exhibiting the highest burden across all PCOSQ domains. These results align with previous research work conducted by Hahn *et al.*, Bazarganipour *et al.*, and Kolhe *et al.* [32–34]. Our findings show that higher psychological distress, body image issues, infertility, and weight-related distress were observed in hyperandrogenic and anovulatory phenotypes.

Furthermore, BMI and hirsutism cause a negative impact on QoL, so personalized treatment approaches are required [35]. Phenotype A is the major concern affecting the overall health of women, requires targeted intervention for metabolic, reproductive, and emotional health. Further studies are needed to explore the longitudinal changes in QoL post-treatment.

CONCLUSION

Study findings reveal the diverse impact of PCOS clinical characteristics on QoL across different phenotypes. Phenotype A women exhibited poor QoL and phenotype D shows the highest scores. HA, menstrual irregularities, and infertility were major areas of concern causing psychological distress among PCOS-affected women. BMI influenced menstrual irregularities and hirsutism, suggesting metabolic involvement. The negative correlation between BMI and hirsutism indicates new insights into the study of hormonal factors in obesity, which might alter hirsutism severity. Finally, observations emphasize the need for personalized treatment managing both metabolic and psychological concerns of PCOS to improve the overall health of women.

ACKNOWLEDGMENT

We extend our appreciation to the health-care professionals of all the gynecological clinics at Bhimavaram for their kind assistance and continuous encouragement throughout this research journey.

AUTHOR'S CONTRIBUTION

Sri Chandana Mavulati collected, interpreted, and analyzed the study. Sujatha Dadoala guided in designing and drafting the work. The final manuscript was reviewed and accepted by all the authors of the study.

CONFLICTS OF INTEREST

The authors confirm no conflicts of interest.

FUNDING

Nil.

ETHICAL APPROVAL

The study received ethical approval from the Institutional Ethical Committee of the Shri Vishnu Educational Society has approved the study (IEC Ref No: VDC/IEC/fac/2018/14).

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