Assessment of Etiological Factors for the Incidence of Polycystic Ovary Syndrome/Polycystic Ovary Disease and the Pharmacists Review on Treatment Protocols – A Comprehensive Prospective Observational Study

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Abstract

Background: This study aimed to evaluate the prevalence and contributing factors of Polycystic Ovary Syndrome (PCOS) and Polycystic Ovary Disease (PCOD) among women, along with their awareness levels and the role of pharmacists in management. **Methodology:** A prospective observational study was conducted at the Maharaja Institute of Medical Sciences (MIMS), Vizianagaram, from November 2024 to February 2025. A total of 100 female patients from the Department of Gynaecology and Obstetrics were included, based on the Rotterdam diagnostic criteria.Data were collected using a standardized questionnaire covering demographic details, clinical symptoms, awareness levels, and pharmacist interventions. Statistical analysis employed descriptive methods (mean, standard deviation, percentages) and inferential tests, including ANOVA to examine associations between demographic/clinical factors and disease severity. A p-value <0.05 was considered significant. **Results:** Among the participants, 47 were diagnosed with PCOS and 53 with PCOD. A significant portion (53%) had limited or no awareness about their condition. Irregular menstruation (85%), heavy bleeding (71%), and scalp hair loss (74%) were common symptoms. Most women (48%) had normal BMI, while 36% were overweight and 12% obese. Urban residents showed a higher prevalence. Pharmacist interventions addressed drug-related issues in 18% of cases. The analysis indicated statistically significant associations between symptoms and disease severity (p < 0.05). **Conclusion:** The findings highlight the increasing burden of PCOS/PCOD, especially among young adult women. Poor awareness contributes to delayed diagnosis, while pharmacists play a key role in patient education, side-effect management, and lifestyle modification support.Strengthening early intervention, awarenessand active pharmacist involvement can improve outcomes.

Key words: Awareness, hormonal disorders, infertility, menstrual irregularities, obesity, polycystic ovary disease, polycystic ovary syndrome, pharmacist intervention

INTRODUCTION

Polycystic ovary syndrome (PCOS) is a prevalent endocrine disorder that mostly affects women who are of reproductive age and is characterized by hyperandrogenism, ovulatory dysfunction, oligomenorrhea, and other hormonal-related problems. Frequently observed symptoms include hirsutism, amenorrhea, and infertility.

The etiopathology of PCOS remains complicated and uncertain. Increasing research shows that it is a multigenic condition with epigenetic and environmental factors, with changes in nutrition and lifestyle.[1] PCOS presents with a range of clinical characteristics, biochemical features, and metabolic disturbances.[2] Obesity exacerbates androgen elevation, worsening PCOS complications. It is commonly observed in women with higher body mass index (BMI) and is linked to metabolic issues such as insulin resistance, elevated fasting insulin, and reduced SHBG levels.[3] The long-term complications of PCOS involve cardiovascular illness, hypertension, endometrial cancer, ovarian cancer, and non-insulin-dependent diabetes mellitus.[4]

Ongoing efforts to systemize the diagnostic criteria for PCOS have resulted in diverse interpretations. In 1990, hyperandrogenism and oligo/anovulation were the criteria used by the National Institutes of Health (NIH) to identify PCOS, with polycystic ovaries being indicative but not conclusive. The 2003 Rotterdam criteria extended this to include any two of the following: Oligo-amenorrhea, hyperandrogenism, or polycystic ovarian morphology (PCOM). The Androgen Excess Society (AES) placed an intense focus on hyperandrogenism associated with oligo-anovulation or PCOM in 2006. The 2012 NIH workshop validated the Rotterdam criteria which remains the most widely accepted.[5,6]

Global prevalence shows variations, with estimates ranging from 5.5% (NIH) to 11.5% (Rotterdam) and 7.1% (AES), influenced by the criteria used and differences in study methods.[7-9]

Given the increasing prevalence of PCOS, it is important to assess the etiological factors aiding in its development and assess the impact of current treatment protocols. This comprehensive prospective observational study helps in identifying primary causative factors and assessing the treatments initiated from a pharmacist's perspective.

Aim of study

The study's objectives are to evaluate the etiological elements that contribute to the development of polycystic ovary disease (PCOD) and PCOS, as well as to analyze the pharmacist's perspective on treatment protocols. It was observed that the majority of women lack sufficient awareness about PCOS and PCOD, despite the fact that their prevalence is rising globally. We have conducted a study to determine and interpret the knowledge among the female individuals in the local government hospital and also analyze symptoms such as menstrual irregularities, hirsutism, alopecia, and acne problems.

RESEARCH METHODOLOGY WITH METHODOLOGY

Study design

A mixed-methods approach was used, combining structured instruction and an assessment-based questionnaire.

Study setting

The research was carried out at the Maharaja Institute of Medical Sciences (MIMS Hospital), Vizianagaram, Andhra Pradesh.

Study duration

November 2024 to February 2025 (4 months).

Sampling technique

Purposive and convenience sampling was employed to ensure relevant and accessible data collection.

Sample size

This study involved 100 inpatients and outpatients attending the gynecology and obstetrics department.

Inclusion criteria

Patients who are diagnosed with PCOS/PCOD based on the Rotterdam criteria. Menstruating women of any age are eligible. All patients must provide informed consent or parental consent if under 18, for inclusion in this study. Patients must have complete clinical data and be currently undergoing or recently treated for PCOS/PCOD at MIMS.

Exclusion criteria

Pregnant women and patients with severe comorbidities or mental health disorders are excluded from our study. Individuals who did not provide consent were excluded.

Study tool

A standardized questionnaire with four sections was used: demographics, awareness of PCOS/PCOD, clinical examination to ascertain prevalence, and sources of information about the condition.

Sampling procedure

Eligible patients completed the questionnaire, followed by counseling. Collected data were analyzed and recorded.

Ethical considerations

The study was approved by the Institutional Ethics Committee of Avanthi Institute of Pharmaceutical Sciences, Vizianagaram. Written informed consent was obtained from all participants.

Statistical analysis

Data were summarized using descriptive statistics (mean, standard deviation, and percentages). Inferential analysis was performed using analysis of variance (ANOVA) to assess associations between demographic/clinical factors and disease severity, with $P < 0.05$ considered statistically significant.

RESULTS AND OUTCOMES WITH RESULTS

Responses were collected and analyzed from 100 completed questionnaires.

Study population demographics

Responses were collected and analyzed from 100 completed questionnaires. Table 1 presents the demographic characteristics of the study population. Most participants (52%) were aged 20–24, with 19 participants aged 21. The majority (72%) resided in urban areas, while 28% were from rural regions. Most women (62%) were unmarried. Regarding educational status, 48% had completed undergraduate studies, 33% had primary education, 11% were illiterate, and 8% had postgraduate education. Regarding occupation, 53% were students, 32% housewives, and 15% employed. None of the participants reported alcohol consumption.

Symptoms

The most commonly reported symptoms were irregular menstrual cycles (85%) and heavy bleeding (71%). Other symptoms, including skin tags (8%) and less frequent manifestations (3%), were less common [Figure 1].

BMI

BMI data showed that 48% of participants had a normal BMI, 36% were overweight, 12% were obese, and 4% were underweight [Figure 2].

Health and lifestyle factors

Most participants (77%) were non-vegetarian, while 23% followed a vegetarian diet. Regarding allergies, 84% reported none, and 16% had one or more allergies. Physical activity was low, with 77% physically inactive and 23% active [Figure 3a-c].

Family history

Family history data are presented in Figure 4. It was found that hypertension (36%), diabetes mellitus (28%), obesity (20%), and PCOS/PCOD (13%) were the most commonly

Table 1: Study population demographics

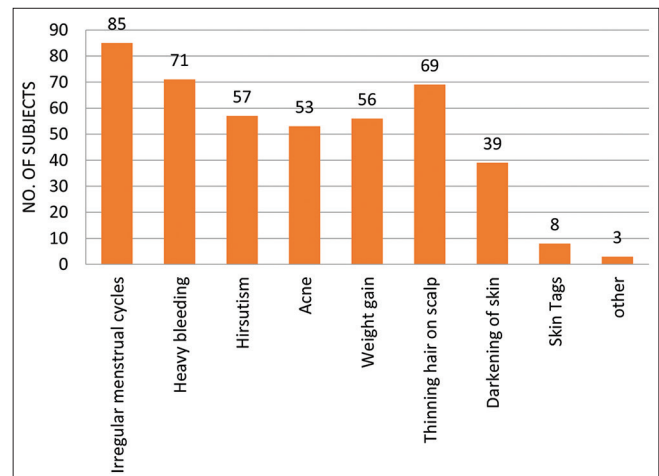| Demographic details	No. of subjects	Percentage	Mean
Age group			
15–19	15	15	17
20–24	52	52	
25–29	15	15	
30–34	11	11	
35–39	3	3	
40–44	4	4	
Residence			-
Rural	28	28	
Urban	72	72	
Marital status			-
Married	38	38	
Un married	68	62	
Educational status			-
Illiterate	11	11	
Primary education	33	33	
UG	48	48	
PG	8	8	
Occupation			-
Student	53	53	
House wife	32	32	
Job	15	15	

Figure 1: Symptoms versus number of subjects

reported conditions among the participants. In addition, 32% of the women had no family history of any of these common diseases.

Awareness and case distribution of PCOS/PCOD

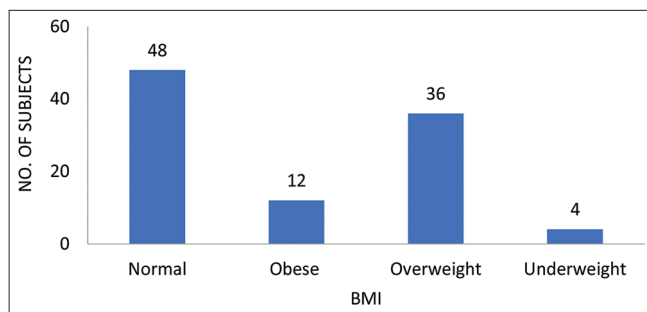Approximately 53% of participants had little to no awareness of PCOS/PCOD, while 47% were adequately aware.

Figure 2: Body mass index versus number of subjects

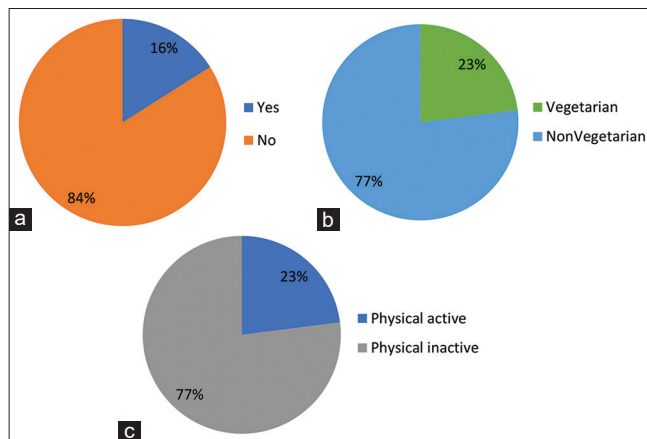**Figure 3:** Pie chart of (a) Allergies versus number of subjects (b) Diet versus number of subjects (c) Physical Activity versus number of subjects
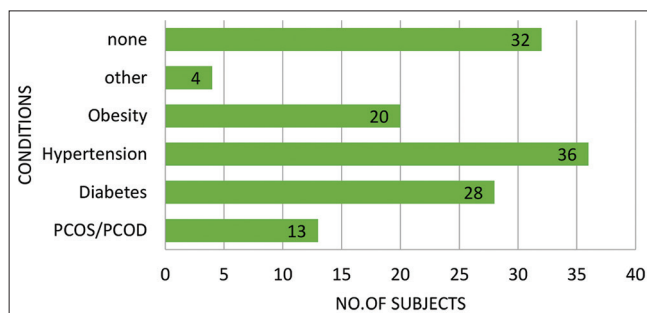

Figure 4: Family history versus number of subjects

Diagnosis revealed that 53% of women had PCOD and 47% had PCOS [Figure 5a and b].

Medications

Hormonal contraceptives (48%) were the most commonly prescribed medications, followed by dietary supplements (29%), anti-androgens (26%), and metformin (20%). About 26% of participants were advised only lifestyle modifications without medication as shown in Figure 6.

Knowledge regarding PCOS/PCOD

Table 2 presents the knowledge regarding PCOS among the respondents. Most participants correctly answered general
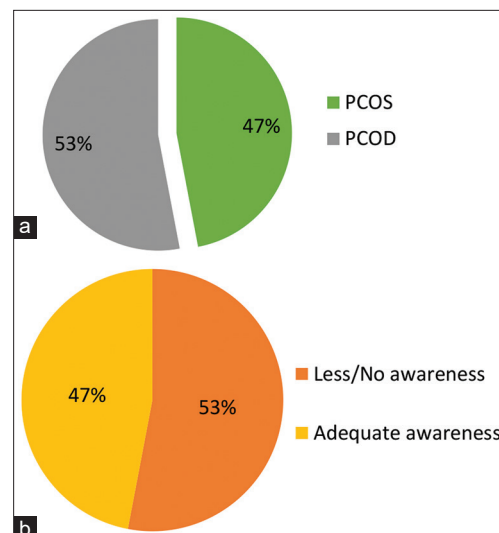

Figure 5: Pie chart (a) case distribution versus number of subjects (b) Awareness versus number of subject
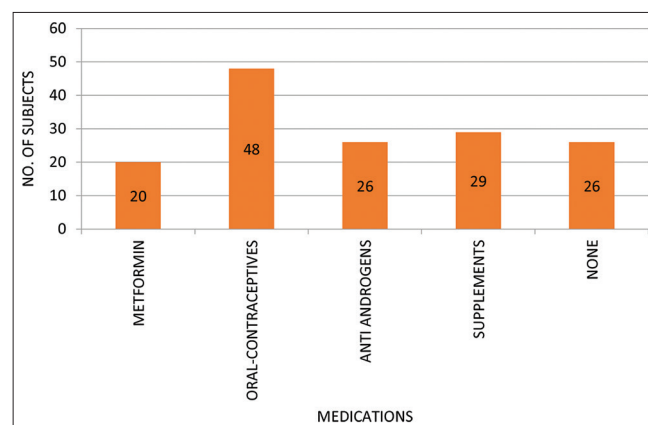

Figure 6: Medications versus number of subjects

knowledge questions, but specific awareness was low. Only 60% knew that PCOS could lead to infertility; 11% were aware of hormonal therapy as a treatment; 15% and 16% knew about increased risks of diabetes and heart disease, respectively; and 4% understood that symptomatic treatment could improve PCOS symptoms.

Calculation of *P*-value and the significance determination is given in Table 3. Based on the table, following interpretation can be obtained.

ANOVA revealed statistically significant effects for both row and column factors (F = 4.178, *P* = 0.02056). The row factor explained approximately 40.16% of the total variation, while the column factor accounted for 38.64%, confirming meaningful group differences.

Clinical evaluation of PCOS/PCOD

Clinical assessment [Table 4] revealed that scalp hair loss was the most common manifestation, affecting 74% of

Table 2: Knowledge regarding PCOS/PCOD			
Questionnaire	Yes	No	Don't know
Have you heard about the term called "polycystic ovary syndrome" (PCOS)?	80	17	1
Have you heard about androgen and other male hormones (e.g., testosterone and androstenedione)	40	41	19
In PCOS, there is an increased level of androgen hormone	27	29	44
Patient suffering from PCOS have small multiple cysts in their ovaries	34	31	35
Obesity may cause PCOS	35	23	42
Prediabetes condition (due to decrease insulin action in body) may cause PCOS	21	33	46
Irregular or absence of menstrual cycle is a symptom of PCOS	62	21	17
Unusual amount of hair growth on different body parts (upper lip, chin, abdomen, breast, thighs, etc.) is a symptom of PCOS	37	37	26
Severe acne problem during the menstrual cycle is a symptom of PCOS	38	28	34
Hair loss from the scalp more than normal is a symptom of PCOS	30	33	37
PCOS diagnosis can be confirmed by vaginal ultrasound	20	29	43
Specific blood test can be used for the diagnosis of PCOS	36	18	46
PCOS may lead to diabetes (sugar)	15	22	63
PCOS may lead to heart diseases	16	24	60
PCOS may lead to infertility (inability to have children)	60	17	23
PCOS may lead to anxiety and depression	23	31	46
Hormonal therapy may be used to treat PCOS	11	28	61
Anti-diabetic medications (metformin) may be used to treat diabetes	18	25	57
Symptomatic treatment may be given to relief the symptoms of PCOS	4	22	74

PCOS/PCOD: Polycystic ovary syndrome/polycystic ovary disease

Table 3: *P* value calculation and significance					
Factor	F-value	*P*-value	Percentage total variation	*P*-value summary	Significance
Row factor	4.178	0.02056	40.16	<0.05	Significant
Column factor	4.178	0.02056	38.64	<0.05	Significant

participants, followed by very heavy menstrual bleeding (>2 pads/day) in 71%, and abnormal hair growth on various body parts in 65%. Continuous abnormal weight gain was observed in 56%, and acne during menstruation was reported by 55% of women. Prolonged menstrual periods (>7 days) occurred in 53% of participants, while 49% experienced partial absence of periods with cycle lengths exceeding 28 days. Regarding metabolic health, 11% had diabetes, and 32% reported a family history of diabetes. These findings highlight the multifactorial clinical presentation of PCOS/PCOD, encompassing hyperandrogenism, menstrual irregularities, metabolic disturbances, and dermatological manifestations.

Calculation of *P*-value and the significance determination is given in Table 5. Based on the table, the following interpretation can be obtained.

ANOVA indicated that symptoms (row factor) had a highly significant effect (F = 12.34, $P < 0.001$), explaining 65.8% of total variation, and the number of cases (column factor) was also significant (F = 6.78, $P = 0.010$), accounting for 14.9% of variation [Table 5].

Pharmacist intervention in treatment protocols

Pharmacist interventions [Table 6] identified several issues in treatment management. Side effects were addressed in 18% of patients, while 16% experienced allergies or contraindications. Inaccurate drug selection occurred in 8% of cases, and potential drug interactions were noted in 5% of participants. These findings emphasize the critical role of pharmacists in optimizing therapy, ensuring patient safety, and improving adherence to treatment protocols.

DISCUSSION

This study has revealed a high prevalence of PCOS and PCOD among young women. A significant concern observed during the study was the lack of awareness regarding these

conditions, including their causes, risk factors, and long-term health implications. This pattern was observed by Zaitoun *et al.*[10] This study evaluated female students' awareness of PCOS in the United Arab Emirates and found that only 38% of them were familiar with the condition, indicating low reproductive health knowledge and poor PCOS awareness.

An analogous investigation by Naz *et al.*[11] in Pakistan highlighted that many women diagnosed with PCOS had limited knowledge about their condition and were unaware of its long-term health consequences, including infertility and metabolic risks. This lack of awareness often results in delayed diagnoses and treatments. In line with these findings, the study also revealed that a significant number of women only sought consultation with a gynecologist after experiencing more severe symptoms. This pattern mirrors the observations of Gupta *et al.*[12] in India, who found that women with PCOS/PCOD typically visit healthcare providers only after symptoms like infertility or substantial weight gain become more pronounced.

The study also found that 48% of participants were either overweight or obese, a finding consistent with other research indicating that women with PCOS are more prone to weight gain and difficulty maintaining a healthy BMI. Arya *et al.*[13] emphasized that women with PCOS are at an increased risk of obesity, which can worsen symptoms like insulin resistance, leading to a cycle of deteriorating health outcomes. This aligns with the study's findings and underscores the need to include weight management as a crucial aspect of managing PCOS/PCOD.

In addition, the study revealed a higher prevalence of PCOD (53%) compared to PCOS (47%) in the sample. This differs from studies such as Mehreen *et al.*,[14] which reported a higher prevalence of PCOS. The difference may be attributed to regional variations in genetic factors, environmental influences, and differences in diagnostic criteria across various healthcare settings.

While the finding that a majority of affected individuals were undergraduates, particularly in the 20–24 age group, highlights a significant concern regarding PCOS/PCOD awareness among younger women, it is important to consider several factors that may influence this trend. One possible explanation, as noted by Naz *et al.*,[11] is that young women in this age group may still be in the process of recognizing or understanding the early signs and symptoms of PCOS/PCOD, which can often be subtle or attributed to stress, lifestyle changes, or other health conditions common in university life. Furthermore, many of the symptoms associated with PCOS/PCOD, such as irregular periods or mild weight gain, are not always immediately alarming and might not prompt early medical consultation.

Interestingly, this study also found that urban residents were more frequently affected by PCOS/PCOD symptoms compared to those in rural areas. This trend may be linked to lifestyle factors, including dietary habits, stress levels, sedentary routines, and environmental influences commonly associated with urban living.

A key risk factor observed in this study was a family history of hypertension. Many of the patients diagnosed with PCOS/PCOD had a familial predisposition to high blood pressure, suggesting a possible genetic link or shared lifestyle patterns contributing to the disorder. A similar study by Yilmaz *et al.*[15] showed evidence of clustering for metabolic syndrome, hypertension, and dyslipidemia in first-degree relatives of women with PCOS, suggesting shared genetic or environmental influences.

Table 4: Clinical evaluation of PCOS/PCOD versus no. of cases

Clinical evaluation of PCOS/PCOD	No. of cases	Percentage
History of PCOS in your mother or sister	9	9
Very heavy periods (more than 2 pads per day)	71	71
Prolonged periods (more than 7 days)	53	53
Complete absence of periods (not at all)	31	31
Partial absence of periods (not after 28 days)	49	49
Acne problem during menstrual cycle	55	55
Unusual amount of hair loss from scalp	74	74
Unusual amount of hair growth at different parts of your body	65	65
Discoloration or dark color patches on skin	37	37
Continuous abnormal weight gain	56	56
Patients with diabetes	11	11
Family history of diabetes	32	32

PCOS/PCOD: Polycystic ovary syndrome/polycystic ovary disease

Table 5: *P* value calculation and significance

Factor	F-value	*P*-value	Percentage of total variation	*P*-value summary	Significance
Total row factor (symptoms)	12.34	<0.001	65.8	$P<0.001$	Significant
Total column factor (no. of cases)	6.78	0.010	14.9	$P<0.05$	Significant

Table 6: Pharmacist intervention in treatment protocols

Parameter	No. of patients with Issue	Percentage
Drug interactions	5 patients	5
Drug selection	8 patients	8
Patient allergies/contraindications	16 patients	16
Side effect management	18 patients	18

In this study, 18% of patients had their side effects managed, similar to Aung *et al.*,[16] who found pharmacist-led interventions addressed adverse drug reactions in about 10–17% of patients. This study also found that 16% of patients had allergies or contraindications, aligning with Yildiz[17] who reported similar potential adverse cardiovascular and metabolic effects of oral contraceptives. In addition, this study observed an 8% drug selection inaccuracy. Finally, this study identified drug interactions in 5% of cases, indicating that patients with multiple comorbidities may face a higher risk of interactions.

In addition, a sedentary lifestyle was another concerning factor among PCOS/PCOD patients. A majority of them were not actively engaged in physical exercise, which is a crucial element in managing and preventing the condition. Lack of physical activity can exacerbate hormonal imbalances, insulin resistance, and weight gain, further aggravating the symptoms of PCOS/PCOD.

CONCLUSION

The present study demonstrates a considerable prevalence of PCOS/PCOD among young adults, with a significant lack of awareness, particularly among undergraduate populations. Menstrual irregularities, hyperandrogenism, and insulin resistance were identified as the most common manifestations, often complicated by delayed diagnosis. Lifestyle factors such as unhealthy dietary patterns, obesity, and physical inactivity were strongly associated with increased disease severity. The findings further suggest that urban populations are more affected due to stress and sedentary habits, whereas rural populations face challenges related to limited healthcare access. Pharmacists hold a pivotal role in this context by fostering patient education, ensuring adherence to prescribed therapies, and promoting lifestyle modifications including balanced nutrition, physical activity, and stress management. Targeted interventions in urban areas to address lifestyle-associated risks, along with improved healthcare accessibility in rural settings, are essential to mitigate disease severity and optimize long-term outcomes.

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