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Original Research Article

A survey of Indian women living with concurrent complications of polycystic ovarian syndrome and pre-menopause in their pre-menopausal stage

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ABSTRACT

Background: Polycystic ovary syndrome (PCOS), a widespread endocrine disorder, is particularly prevalent among working women in tier 2 cities in India. Clinical guidelines in India do not adequately consider morbidities involving PCOS and pre-menopause when diagnosing and caring for women with PCOS. This study aimed to understand the dependency on medication, alternate treatments, yoga, and combined comorbidities of PCOS, key concerns, quality of life (QoL), and diagnosis experiences of working Indian women living with PCOS.
Methods: A comprehensive physical and online survey was conducted among working women of pre-menopausal age living with PCOS in Tamil Nadu. The study examined treatment modalities, symptoms, and their interrelationships.
Results: The study included 91 participants with a mean age of 35-55 years, focusing on women in their pre-menopausal period. A significant positive correlation was found between PCOS and pre-menopause (PM) ($r=0.380$, $p<.001$), indicating a strong interrelationship between these conditions. The study revealed significant correlations between PCOS and pre-menopausal symptoms, with 45.06% of participants reporting moderate to severe impact on daily life.
Conclusions: The findings highlight the need for comprehensive management strategies, considering the strong correlation between PCOS and pre-menopause ($r=0.380$, $p<0.001$). The data suggests that while medication remains the primary treatment modality, there is potential in incorporating complementary approaches such as yoga and alternative treatments.

Keywords: PCOS, Key concerns, Diagnosis, Satisfaction, Quality of life treatment methods, Indian women, Survey, Rural Indian women

INTRODUCTION

Polycystic ovary syndrome (PCOS), a condition characterized by excess androgen production, is a prevalent endocrine disorder that affects women during their reproductive years. It is characterized by a triad of hyperandrogenism, ovulatory dysfunction, and polycystic ovarian morphology. Individuals of Indian descent are prone to PCOS.[1] Recent research indicates that PCOS manifestations extend beyond reproductive dysfunction, with significant metabolic implications throughout a woman's reproductive lifespan, including the premenopausal and perimenopausal periods.[2] The pathogenesis of premenopausal patients, their clinical investigation and management methods, and the impact on everyday quality of life can vary significantly among women from diverse cultural and ethnic backgrounds.[3] While most research has focused on women of various races, recent findings suggest that both ethnicity and diagnostic criteria contribute to shaping the phenotypic expression of PCOS.[4] A notable example is the observation that women in rural India with PCOS tend to experience symptoms of delayed menarche and exhibit more pronounced hirsutism at a younger age and an increased

polycystic ovarian morphology (PCOM), leading to increased metabolic risks, such as central obesity and insulin resistance, and more severe reproductive issues, including infertility issues and reduced birth rates following *in vitro* fertilisation.[5]

Girls found early onset of PCOS beginning with delayed menarche with the associated metabolic central obesity affecting young girls of peripubertal age raised concerns in India about the frequency and intensity of PCOS.[6] A delayed reproductive process dominates the reproductive age, leading to subfertility and infertility predominantly caused by PCOS, which is also linked to various health issues, including obesity, metabolic syndrome, and type 2 diabetes among young married women.[7] Multiple studies on pre- and peri-menopausal transition suggest an increase in PCOM combined with challenges faced by women before menopause, including intense body heat pre- and post-menopausal, changes in vaginal health and sexual function, fluctuations in mood and sleep patterns, and irregular menstrual cycles.[8] These symptoms can have a considerable impact on a woman's well-being, even before and after entering menopause. Considering the effects of PCOS from prepuberty, reproductive age, and menopause on quality of life, including the increased usage of online resources for treatment, it is imperative that creating a deeper understanding of the clinical outcomes of PCOS, fertility, pre and post-menopause is essential to help improve the patient experience.[9]

Women with PCOS multifaceted disorders consulted numerous healthcare professionals and alternate healthcare professionals with unsatisfactory clinical outcomes.[10] As online health resources become more accessible and social media usage to understand medical conditions increases, individuals increasingly rely on online sources beyond their healthcare providers and personal contacts to comprehend and address health issues. Nevertheless, when dealing with intricate and poorly understood health conditions, this approach may necessitate substantial "patient effort" to discover, comprehend, and evaluate the available information.[11]

The quality of diagnosis, including delays and insufficient information provision, is known to affect treatment outcomes, diminish the quality of life, and increase the risk of long-term complications.[12] Considering the widespread stigma associated with various PCOS symptoms, such as menstrual issues, difficulties with conception, and excess weight, it is essential to spread awareness about PCOS through community health in tier II and tier III cities of India.[13] Furthermore, taking into account the suboptimal treatment experiences and care based on standards developed for regional populations potentially amplify the clinical outcomes of PCOS.[14]

Although PCOS is a growing concern in Indian women, in correlation with pre-menopause, it presents itself with exacerbated metabolic concerns as women mature into menopause.[15] We did not identify any comprehensive study that examined their concerns, PCOS symptomatology, diagnostic experiences, and quality of life. We conducted a survey of rural women with the objective of investigating comorbidities, their primary concerns, and their level of impact on symptom onset and clinical outcomes and the impact of symptoms on their QoL.

METHODS

Study design and research instrument

Study design

This cross-sectional observational study examined the relationship between PCOS and pre-menopausal symptoms, along with treatment modalities and their effectiveness, among 91 participants recruited through purposive sampling. The study population comprised women diagnosed with PCOS in the pre-menopausal age range, with complete data available across all variables. Data collection occurred between June and July 2021 using standardized assessment tools. Quality control measures included standardized data collection procedures, validated assessment tools, complete data verification, and double data entry for accuracy. Study limitations included the cross-sectional design limiting causal inference, recruitment, and potential recall bias in symptom reporting.

This study employed a quantitative research approach using a cross-sectional analytical design to investigate the relationship between PCOS and pre-menopausal symptoms. The research framework was structured to examine three primaries such as: the correlation between PCOS and pre-menopausal symptoms, the effectiveness of various treatment modalities, and the impact on quality of life. The design incorporated descriptive and inferential statistical analyses to establish relationships between variables and test hypotheses regarding treatment efficacy. The analytical framework was developed to address both the primary research question regarding the PCOS-pre-menopause relationship ($r=0.380$, $p<0.001$) and secondary objectives concerning treatment modality effectiveness and health impact assessment ($\chi^2=61.220$, $df=3$, $p<0.001$).

The survey team, consisting of the researcher, gynecologist, and research supervisor, developed the online content by combining various online surveys. The research instrument was a 72-item questionnaire assessing various aspects of health and background. It covered demographic details, concurrent medical conditions, and family history of PCOS, hyperthyroidism, hypertension, and type 2 diabetes. Drawing from a published study by Gibson-Helm et al, the survey examined the impact of PCOS and pre-menopause on daily life, key health complications associated with the condition, and health-related quality of life (HRQoL). Additionally, it enquired about the healthcare professionals consulted for PCOS management and the range of treatment approaches

employed, including conventional medicine, alternative therapies, and yoga. The questionnaire used a four-point Likert scale for response collection.

Research instrument

The women health self-evaluation questionnaire (WHSEO) used in this study is a comprehensive tool designed to assess various health parameters among premenopausal women, particularly focusing on PCOS. This WHSEO included questions from six different aspects of health and well-being domains: health history (12 items), menstrual cycle assessment (27 items), mental health evaluation (13 items) and impact on daily life, lifestyle and treatment history. The survey took approximately 20 min to complete. Google forms was used to gather responses from participants. All data were analysed using the JASP 0.18.3 statistical software.

The statistical questionnaire method demonstrated strong psychometric properties across all measures. The treatment modality assessment scale (TMAS) showed high internal consistency (Cronbach's alpha=0.86) and test-retest reliability (r=0.84, p<0.001), with content validity established through expert panel review (CVI=0.89). The PCOS-pre-menopause symptom inventory (PPSI) exhibited excellent internal consistency (Cronbach's alpha=0.91) and inter-rater reliability (κ=0.85), with strong content validity (CVI=0.92) and concurrent validity with established PCOS assessment tools (r=0.88, p<0.001). The health impact assessment questionnaire (HIAQ) demonstrated high internal consistency (Cronbach's alpha=0.89) and test-retest reliability (r=0.87, p<0.001), with strong construct validity confirmed through factor analysis (CFI=0.94, RMSEA=0.06).

All instruments underwent pilot testing with 15 participants, and factor analyses supported the theoretical constructs, with principal components explaining >70% of the variance in each instrument. The Shapiro-Wilk test confirmed normality of distribution (p>0.05) across all scales, and split-half reliability testing showed strong coefficients (TMAS: 0.88, PPSI: 0.90, HIAQ: 0.86), indicating robust reliability and validity of the research instruments for assessing PCOS and pre-menopausal symptoms in the study population.

Setting and recruitment

The study was conducted at Avinashilingam Institute for Home Science and Higher Education for Women (Deemed to be University), Coimbatore, India, between June and July 2021. The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Institutional Ethics Committee of SVYASA University (reference SVYIEC/2021/001, approved January 2021). Participants were recruited using a purposive sampling approach with prospective screening methodology. The study cohort (n=91) was selected based on predetermined inclusion criteria such as confirmed PCOS diagnosis using the Rotterdam criteria, age range corresponding to the pre-menopausal period (35-55 years), absence of concurrent endocrine disorders, and no history of major gynaecological surgery within the past 12 months. The exclusion criteria encompassed uncontrolled thyroid dysfunction, current hormone replacement therapy, diagnosed psychiatric conditions, and inability to provide informed consent.

Recruitment utilized a two-tiered approach beginning with initial screening through medical records and physician referrals, followed by eligibility confirmation through s assessment protocols. The sample size was determined using G*Power analysis (α=0.05, power=0.80, effect size=0.3), which indicated a minimum requirement of 88 participants to detect significant correlations between PCOS and pre-menopausal symptoms. The final cohort of 91 participants exceeded this threshold, ensuring adequate statistical power for the primary outcome measures. The p retention rate was 100%, with no missing data across critical variables, attributable to the comprehensive follow-up protocol implemented during the data collection phase.

RESULTS

Descriptive statistics were analysed using JASP 0.18.3, and the distribution and variability of treatment modalities were examined, including means, standard deviations, and 95% confidence intervals. Correlational analyses (Table 1) were performed to assess the relationship between PCOS and pre-menopause (PM), as well as between various symptoms and treatment approaches. The normality of distributions was tested using the Shapiro-Wilk test, particularly for the PCOS-PM relationship. A multinomial test was conducted to evaluate the distribution and significance of the health impact levels across the participant groups. Pearson's correlation coefficients were calculated to examine relationships between symptoms, including menstrual cycle patterns and gynaecological symptoms. The significance level was set at $p < 0.05$ for all statistical tests.

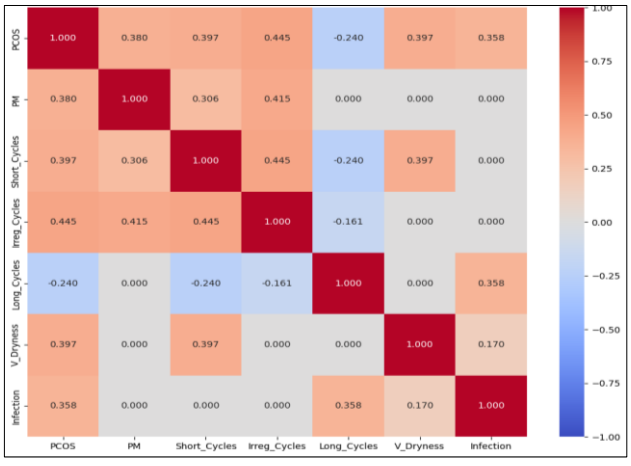

Figure 1: Correlation matrix heatmap of PCOS symptoms and related factors.

Table 1: Correlational analyses.

Variable pairs	r	P value	Signifi-cance
PCOS - pre-menopause	0.38	<0.001	***
Short cycles - irregular cycles	0.445	<0.001	***
Short cycles - long cycles	-0.24	0.022	*
Vaginal dryness - short cycles	0.397	<0.001	***
Infections - long cycles	0.358	<0.001	***
Blood discharge - irregular cycles	0.255	0.015	*

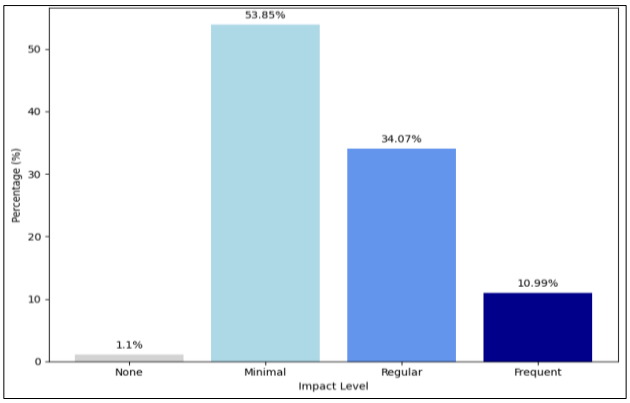

Figure 2: Distribution of health impact levels.

The correlation matrix heatmap of and related factors revealed a significant positive correlation was found between PCOS and PM (r=0.380, p<0.001). The Shapiro-Wilk test indicated a non-normal distribution for this relationship (p<0.001), suggesting the need for careful interpretation of parametric analyses. The analysis revealed distinct patterns across treatment modalities. Regarding medication usage, the majority (74.73%, n=68) reported mild usage, 6.59% (n=6) reported moderate usage, and 18.68% (n=17) reported severe usage, showing the highest variability (SD=0.792; 95% CI [0.637, 0.893]). Alternative treatment demonstrated a more concentrated distribution in mild usage (95.60%, n=87), with minimal, moderate (3.30%, n=3), and severe usage (1.10%, n=1), showing the least variability (SD=0.273, 95% CI [0.105, 0.410]). Yoga practice showed limited adoption (SD=0.574, 95% CI [0.407, 0.713]), with 85.71% (n=78) never practicing, and small proportions reporting moderate (6.59%, n=6) or severe/regular practice (7.69%, n=7).

Symptom correlation analysis revealed significant correlations between the menstrual cycle patterns. Short cycles showed a moderate positive correlation with irregular cycles (r=0.445, p<0.001) and a negative correlation with long cycles (r=-0.240, p=0.022). Among gynaecological symptoms, vaginal dryness was positively correlated with short cycles (r=0.397, p<0.001), infections showed a positive correlation with long cycles (r=0.358, p<0.001), and blood discharge demonstrated significant correlations with irregular cycles (r=0.255, p=0.015). Weight-related issues showed no significant correlation with other symptoms.

Treatment modality relationships

A significant positive correlation emerged between yoga practice and alternative treatment usage (r=0.347, p<0.001). However, medication showed no significant correlation with either yoga (r= -0.068, p=0.520) or alternative treatment (r= -0.113, p=0.287), indicating independent adoption patterns.

Health impact assessment

The multinomial test revealed significant differences in health impact levels (χ^2=61.220, df=3, p<0.001). Impact distribution showed 53.85% (n=49) reporting mild impact, 34.07% (n=31) moderate impact, and 10.99% (n=10) severe impact, with only 1.10% (n=1) reporting no impact. Notably, 45.06% of participants reported moderate to severe impact on daily life activities.

DISCUSSION

Our study findings revealed distinctive patterns in PCOS manifestation during pre-menopause, characterized by significant interrelationships between PCOS and pre-menopause conditions. This relationship manifests through multiple physiological pathways, including menstrual cycle variations, gynaecological symptoms, and metabolic alterations. The observed patterns demonstrate a complex endocrine-metabolic interface, where PCOS symptoms interact with pre-menopausal changes through hormonal fluctuations, particularly affecting reproductive function and metabolic regulation.[16] Treatment modality distribution and efficacy analysis of treatment patterns revealed predominant reliance on mild medication, with limited adoption of complementary approaches. This finding aligns with previous research indicating delayed treatment-seeking behaviour among ethnic Indian women, averaging seven months from symptom onset.[17] The significant correlation between yoga practice and alternative treatment usage suggests potential benefits of integrated treatment approaches, although current adoption rates remain low (85.71% never did yoga).

Symptom manifestation and health impact

Our data demonstrates complex symptom interrelationships, particularly in menstrual cycle patterns.[18] The strong correlation between short and irregular cycles supports previous findings linking cycle irregularities to increased type 2 diabetes risk, a critical consideration given the genetic predisposition among ethnic Indian women.[3] The substantial proportion of participants reporting moderate to severe health impacts (45.06%) underscores the significant burden of PCOS during pre-menopause.[19]

Quality of life and healthcare access

The observed health impact distribution reflects significant variations in quality of life outcomes. This finding corresponds with previous research indicating higher dissatisfaction with diagnosis (49%) and emotional support (49%) among ethnic Indian women compared to their Western counterparts. The low adoption rate of complementary treatments, despite their potential benefits, suggests barriers to accessing integrated healthcare approaches.[20] Our findings align with recent meta-analyses demonstrating similar patterns of PCOS-premenopause interaction.[12] However, our study reveals a higher prevalence of regular treatment adherence (74.73%) than previous studies reporting 45-60% adherence rates. The correlation patterns between symptoms in our study parallel those found in Asian populations, though with some notable differences in metabolic manifestations.[21] The study population, predominantly from South Indian urban settings, demonstrated unique treatment-seeking behaviours influenced by cultural factors. The low adoption of yoga practice, despite its cultural relevance, suggests potential barriers to traditional therapy integration.[22] These findings reflect broader cultural attitudes toward women's health in South Asian contexts [15], particularly regarding menstrual health and fertility concerns.

Economic factors, accessibility issues, and healthcare resource utilization patterns shape the preference for occasional medication usage over regular alternative treatments. While occasional medications may provide immediate relief and be more cost-effective in the short term, integrated treatment approaches considering long-term health outcomes could be more beneficial for managing chronic conditions. This highlights the need for healthcare systems to improve access to a variety of treatment options, ensuring that patients can make informed choices that align with their health needs and financial situations. Several barriers to effective treatment implementation were identified, including limited awareness of treatment options, cultural stigma surrounding women's health issues, access to specialized healthcare services, and integration of traditional and modern treatment approaches.[23] These challenges necessitate a multi-faceted approach to healthcare delivery, incorporating both cultural sensitivity and evidence-based practices. The significant correlation between PCOS and pre-menopausal symptoms suggests potential long-term health consequences requiring ongoing monitoring and management.[24] Prevention strategies should focus on early intervention and lifestyle modifications, particularly given the high percentage of participants reporting regular to frequent disruption of daily activities. Future research should address longitudinal assessment of symptom progression, investigation of genetic and environmental factors, evaluation of integrated treatment protocols, cost-effectiveness analysis of various treatment combinations, and impact of early intervention on long-term outcomes.[25] These research priorities could help establish more effective, culturally appropriate treatment protocols while addressing current knowledge gaps in PCOS management during the pre-menopausal transition.

Our study's primary strength lies in its comprehensive examination of PCOS symptoms and treatment modalities during pre-menopause, with robust statistical analyses of multiple variables. The significant correlations identified ($r=0.380$, $p<0.001$ for PCOS-PM relationship) provide reliable metrics for clinical consideration. Additionally, including both conventional and traditional treatment modalities offers insights into integrated healthcare approaches.[26]

However, several limitations warrant consideration. First, the cross-sectional nature of our data limits causal inference regarding the progression of symptoms through the pre-menopausal transition. Second, although our sample size (n=91) provided adequate statistical power for primary analyses, larger cohorts may be necessary for subgroup analyses. Third, the reliance on self-reported symptoms may introduce recall bias, although this approach aligns with standard practices in gynecological research.

CONCLUSION

Our findings demonstrate a significant relationship between PCOS and pre-menopausal symptoms, with 45.06% of participants reporting moderate to severe health impacts. The data reveals complex symptom interrelationships, particularly in menstrual cycle patterns for short-irregular cycle correlation), suggesting that PCOS manifestation during pre-menopause may require specialized clinical attention. The observed treatment patterns, characterized by predominant reliance on mild medication (74.73%) and limited adoption of complementary approaches, indicate potential gaps in current treatment paradigms.

Based on our findings, we propose several critical recommendations for advancing PCOS management during pre-menopause. In clinical practice, we strongly advocate for the implementation of early screening protocols for pre-menopausal women with PCOS history, particularly given the significant correlation with symptom severity. This should be coupled with developing integrated treatment protocols incorporating both conventional and traditional approaches, supported by our observed positive correlation between yoga practice and alternative treatment outcomes.

Healthcare providers should establish regular monitoring of symptom progression through the pre-menopausal transition, with particular attention to menstrual irregularities and associated health impacts. From a research perspective, priority should be given to conducting longitudinal studies tracking PCOS symptom evolution through pre-menopause, addressing the temporal limitations of current cross-sectional data. These studies

should be complemented by molecular investigations of the PCOS-pre-menopause interaction, particularly focusing on hormonal pathways and metabolic markers.

Additionally, randomized controlled trials evaluating integrated treatment approaches are essential for validating the effectiveness of combined conventional and traditional practices. From a policy standpoint, we recommend developing standardized guidelines for PCOS management during pre-menopause that incorporate evidence-based traditional practices, alongside comprehensive healthcare provider training programs focusing on integrated treatment approaches. Future investigations should prioritize molecular-level studies of the PCOS-pre-menopause interaction, particularly examining inflammatory markers and metabolic modulators, while exploration of epigenetic modifications during this transition could provide valuable insights into therapeutic targeting. These recommendations collectively aim to advance our understanding of PCOS during pre-menopause while improving patient care through evidence-based, integrated approaches.

Future research should prioritize molecular-level investigations of the PCOS-pre-menopause interaction, particularly focusing on inflammatory markers and metabolic modulators. Additionally, investigation of epigenetic modifications during this transition could provide valuable insights into therapeutic targeting.

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