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ORIGINAL RESEARCH

Prevalence of PCOS Among Adolescent Girls: A Cross-Sectional Study

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ABSTRACT

Background: Polycystic Ovary Syndrome (PCOS) is a common endocrine disorder with significant implications for adolescent girls' metabolic and reproductive health. While PCOS prevalence studies have been conducted across India, regional data—particularly for adolescents in Jammu—remain scarce. This study aimed to determine the prevalence of PCOS among adolescent girls in the Jammu region.

Methods: A hospital-based, cross-sectional study was conducted among 100 adolescent girls at Government Medical College, Jammu. Participants were selected through multi-stage random sampling, incorporating stratification by age and socioeconomic status. PCOS diagnosis followed the Rotterdam criteria. Data collection included structured questionnaires, clinical examinations (modified Ferriman-Gallwey score for hirsutism, BMI measurements), hormonal assays, and transabdominal pelvic ultrasounds. Statistical analysis employed chi-square tests with significance set at $p < 0.05$.

Results: The overall prevalence of PCOS was 18%. Phenotypic distribution revealed that 8% exhibited all three Rotterdam criteria, while 5% had oligo-/anovulation with signs of hyperandrogenism, 3% had hyperandrogenism with polycystic ovaries, and 2% had oligo-/anovulation with polycystic ovaries. Urban participants showed a higher prevalence (23.1%) compared to rural (8.6%). Similarly, high socioeconomic status was associated with higher PCOS prevalence (26.7%) than middle (16%) or low (10%) groups. Clinically, irregular menstrual cycles (26.7% vs. 5% regular, $p = 0.012$), hyperandrogenism (30% vs. 6%, $p = 0.004$), and family history of PCOS (30% vs. 10%, $p = 0.022$) were significantly associated with PCOS.

Conclusion: This study found that PCOS affects nearly one-fifth of adolescent girls in Jammu, with irregular menstruation and signs of hyperandrogenism as predominant features. Urban residence and family history emerged as potential risk factors. These findings highlight the need for region-specific screening programs and early interventions to mitigate long-term health consequences. Further large-scale studies are recommended to validate these results and explore causal relationships.

Keywords: Polycystic Ovary Syndrome, Adolescents, Hyperandrogenism.

Introduction

Polycystic Ovary Syndrome is a prevalent endocrine disorder affecting women of reproductive age and, increasingly, adolescent girls (1-2). It stands as a primary cause of infertility and is associated with a range of metabolic and reproductive health complications (3-4). Characterized by hormonal imbalances, menstrual irregularities, and/or polycystic ovaries, PCOS presents a significant health challenge with potential long-term consequences (5). Given the syndrome's impact on both immediate well-being and future health, understanding its prevalence among adolescents is crucial for early intervention and management (6).

The global prevalence of PCOS varies considerably, ranging from 2.2% to 26% in women. These variations are attributed to differences in diagnostic criteria, study populations, and geographical locations. Studies indicate that the prevalence of PCOS in adolescents is also subject to regional variation (2). In India, specifically, the reported prevalence varies widely (2,7). This heterogeneity highlights the need for more targeted research on adolescent populations within specific regions to inform effective healthcare strategies (7).

Several studies have investigated the prevalence of PCOS among adolescent girls in India (3-8). A systematic review and meta-analysis of Indian adolescent girls (14-19 years) found a pooled prevalence of 17.74% based on the Rotterdam criteria (2). Another study in the Ahmedabad region found the prevalence of PCOS in adolescent girls to be 13.54%

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(5). These findings highlight the significant burden of PCOS among young women in India and the need for increased awareness and early detection efforts (3-4).
The diagnosis of PCOS in adolescents presents unique challenges. Some features of PCOS can overlap with normal physiological changes during puberty (2). Irregular menstrual cycles, acne, and weight changes are common during adolescence, making it difficult to distinguish between normal developmental changes and early signs of PCOS (2,6). Therefore, careful assessment and the use of appropriate diagnostic criteria are essential for accurate diagnosis and to avoid unnecessary anxiety or treatment (9).
This research paper aims to investigate the prevalence of PCOS among adolescent girls in the Jammu region.

Research Methodology
The present observational, cross-sectional study was conducted to determine the prevalence of PCOS among 100 adolescent girls in and around the Jammu region.
The study was conducted at the Department of Obstetrics and Gynaecology, GMC, Jammu, over 01 year from January 2024 to December 2024. The study includes both urban and rural locations to capture a representative sample, and the subjects were selected for the study as per the following inclusion and exclusion criteria.

- **Inclusion Criteria:**
  - Adolescent girls aged 15-19 years.
  - Girls who have attained menarche at least two years before the study.
  - Willingness to participate in the study and provide informed consent (assent from participants and consent from parents/guardians if participants were minors).
- **Exclusion Criteria:**
  - Girls with a known history of other endocrine disorders (e.g., congenital adrenal hyperplasia, thyroid disease, Cushing's syndrome).
  - Girls who are pregnant.
  - Girls currently undergoing treatment for PCOS or related symptoms.

Informed consent was obtained from all participants (consent from participants and consent from parents/guardians if participants are minors). The confidentiality of participants' data was maintained throughout the study.

Methodology:
An observational study was done in 100 adolescent girls aged 15 to 19 years attending OPD with oligomenorrhea / amenorrhea , signs of hyperandrogenism- hirusitism, acne, androgenetic alopecia were advised for biochemical, hormonal, and ultrasonographic evaluation for diagnosis of PCOS based onRotterdams criteria.

The sample size was calculated based on the estimated prevalence of PCOS in the target population, desired precision, confidence level, and anticipated non-response rate. A sample size calculation was performed using appropriate statistical software to ensure adequate power to detect significant associations.

Data Collection:

- **Questionnaire:** A structured questionnaire was used to collect data on demographic characteristics, menstrual history, medical history, family history of PCOS and related conditions, and lifestyle factors.
- **Clinical Examination:** A physical examination was conducted by trained healthcare professionals to assess signs of hyperandrogenism (e.g., hirsutism, acne) using standardized scoring systems (e.g., the modified Ferriman-Gallwey score for hirsutism). Height, weight, and blood pressure were measured using standard methods.
- **Biochemical Assessment:** Fasting blood samples were collected to measure hormone levels, including testosterone, luteinizing hormone, follicle-stimulating hormone, and insulin.
- **Pelvic Ultrasound:** Transabdominal ultrasound was performed by experienced sonographers to assess ovarian morphology and identify polycystic ovaries.

Method/Criteria for Finding Prevalence of PCOS:
The diagnosis of PCOS was based on the **Rotterdam criteria**, which require the presence of at least two of the following three features:

- Oligo- or anovulation
- Clinical and/or biochemical signs of hyperandrogenism
- Polycystic ovaries on ultrasound (volume more than $10ml^3$, more than 20 follicles of between 2 and 9 mm in at least one ovary)

The prevalence of PCOS was calculated as the proportion of adolescent girls in the study population who met the diagnostic criteria for PCOS.

Statistical Analysis:
The Descriptive statistics (e.g., mean, standard deviation, frequency, percentage) were used to summarize the characteristics of the study population and the prevalence of PCOS. Chi-square tests were used to compare the prevalence of PCOS between different subgroups (e.g., urban vs. rural, different age groups). Logistic regression analysis will be used to identify factors associated with PCOS. The Statistical significance was set at $p < 0.05$. The Data analysis was performed using statistical software such as SPSS.

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Observations and Results:

Table 1: Demographic Characteristics of Study Participants

Parameter	Frequency	Percentage
Age Distribution		
15 years	16	16%
16 years	17	17%
17 years	20	20%
18 years	22	22%
19 years	25	25%
Residence		
Urban	65	65%
Rural	35	35%
Socioeconomic Status		
High	30	30%
Middle	55	55%
Low	15	15%

The study sampled 100 participants aged 15-19, with a mean age of 15±3.8 years. The age distribution showed 16% were 15, 17% were 16, 20% were 17, 22% were 18, and 25% were 19 years old. Urban residents comprised 65% of the participants, while 35% were from rural areas. Socioeconomically, 55% of participants were from middle status, 30% from high status, and 15% from low status, indicating a skew toward urban and middle-to-high socioeconomic backgrounds.

Table 2: Clinical Characteristics of Study Participants

Parameter	Frequency	Percentage
Menstrual History		
Regular cycles	45	45%
Oligomenorrhea (irregular)	35	35%
Amenorrhea (absence)	20	20%
Hyperandrogenism		
Hirsutism (mFG score ≥ 8)	25	25%
Acne (moderate to severe)	30	30%
Alopecia (hair loss)	10	10%
BMI Category		
Underweight (BMI < 18.5)	10	10%
Normal weight (BMI 18.5-24.9)	60	60%
Overweight (BMI 25-29.9)	20	20%
Obese (BMI ≥ 30)	10	10%
Family History		
Diabetes	15	15%
PCOS	12	12%
Hypertension	10	10%

Table 2 summarizes the key clinical characteristics of the study population. Only 45% reported regular menstrual cycles; 35% experienced oligomenorrhea, and 20% had amenorrhea. Regarding hyperandrogenism, 25% showed hirsutism (mFG score of 8+), 30% had moderate to severe acne, and 10% experienced alopecia. In terms of weight, 60% were normal weight, 20% were overweight, 10% were obese, and 10% were underweight. Family history indicated 15% reported diabetes, 12% had relatives with PCOS, and 10% with hypertension.

Table 3: PCOS Prevalence Based on Rotterdam Criteria

Parameter	Frequency	Percentage
Overall Prevalence	18	18%
Phenotypes		
Oligo/Anovulation + Hyperandrogenism + Polycystic Ovaries	8	8%
Oligo/Anovulation + Hyperandrogenism	5	5%
Hyperandrogenism + Polycystic Ovaries	3	3%
Oligo/Anovulation + Polycystic Ovaries	2	2%

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Table 3 reveals key insights into the prevalence and phenotypic distribution of Polycystic Ovary Syndrome (PCOS) among the studied adolescent girls. The overall prevalence of PCOS was found to be 18%, suggesting that nearly one in five met the diagnostic criteria for this disorder.

The most common presentation, seen in 8% of the study population, was the complete triad of oligo/anovulation, hyperandrogenism, and polycystic ovaries, comprising 44.4% of all PCOS cases. The second phenotype, found in 5% of participants (27.8% of PCOS cases), featured oligo/anovulation and hyperandrogenism without polycystic morphology. A small group (3%) showed hyperandrogenism and polycystic ovaries without menstrual irregularities, making up 16.7% of PCOS cases. The least common phenotype, at 2% of the population (11.1% of PCOS cases), included oligo/anovulation and polycystic ovaries without signs of hyperandrogenism.

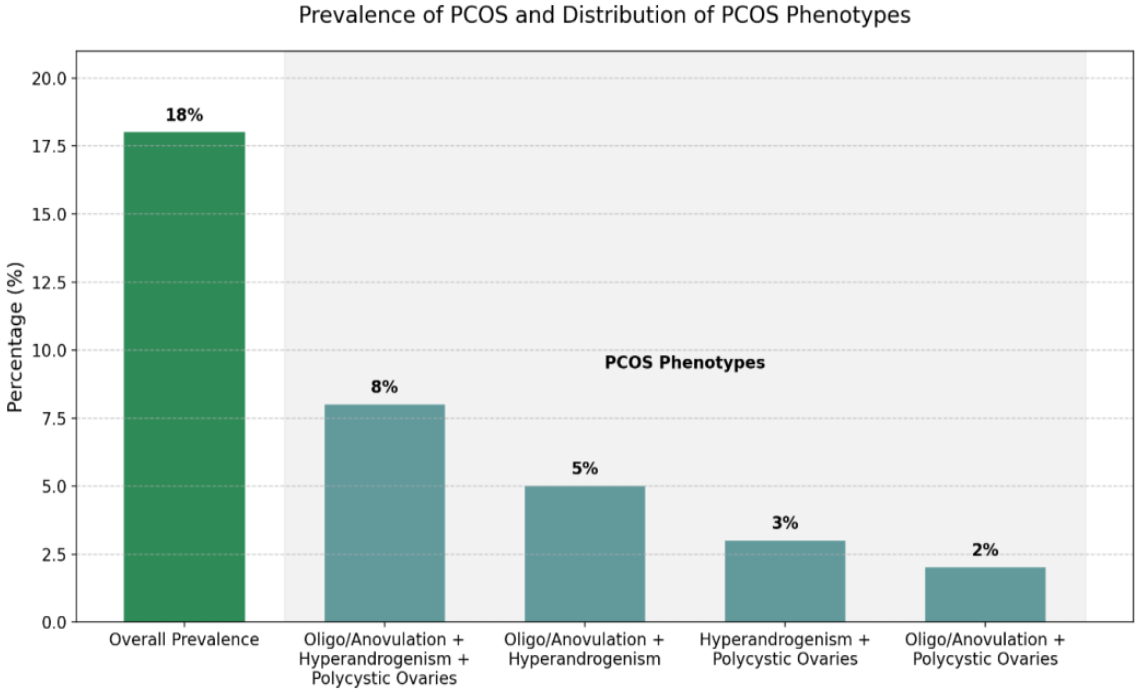

Table 4: Association between Demographic variables and PCOS status:

Variable	Category	PCOS Cases	Total in Category	Prevalence (%)	Statistical Significance
Age	15-17	8	53	15.09%	$\chi^2 = 0.29$ p = 0.59
	18-19	10	47	21.27%	
Residence	Urban	15	65	23.1%	$\chi^2 = 2.3348$, p = 0.1265
	Rural	3	35	8.6%	
Socioeconomic	Low	2	20	10%	$\chi^2 = 2.5294$, p = 0.2823
	Middle	8	50	16%	
	High	8	30	26.7%	

Table 4 shows the association between demographic variables and PCOS prevalence. The late adolescence group (18-19) has a higher prevalence (21.27%) than the early adolescence group (15.09%), but this difference is not statistically significant ($\chi^2 = 0.29$, p = 0.59). A significant disparity exists between urban (23.1%) and rural (8.6%) residents, although it is also not statistically significant ($\chi^2 = 2.3348$, p = 0.1265). High socioeconomic status shows the highest prevalence (26.7%), followed by middle (16%) and low (10%), with differences not being statistically significant ($\chi^2 = 2.5294$, p = 0.2823).

Table 5: Association between Clinical characteristics and PCOS status

Variable	Category	PCOS Cases	Total in Category	Prevalence (%)	Statistical significance
Menstrual History	Regular	2	40	5%	Chi-square: 6.2359 p-value: 0.0125
	Irregular	16	60	26.7%	

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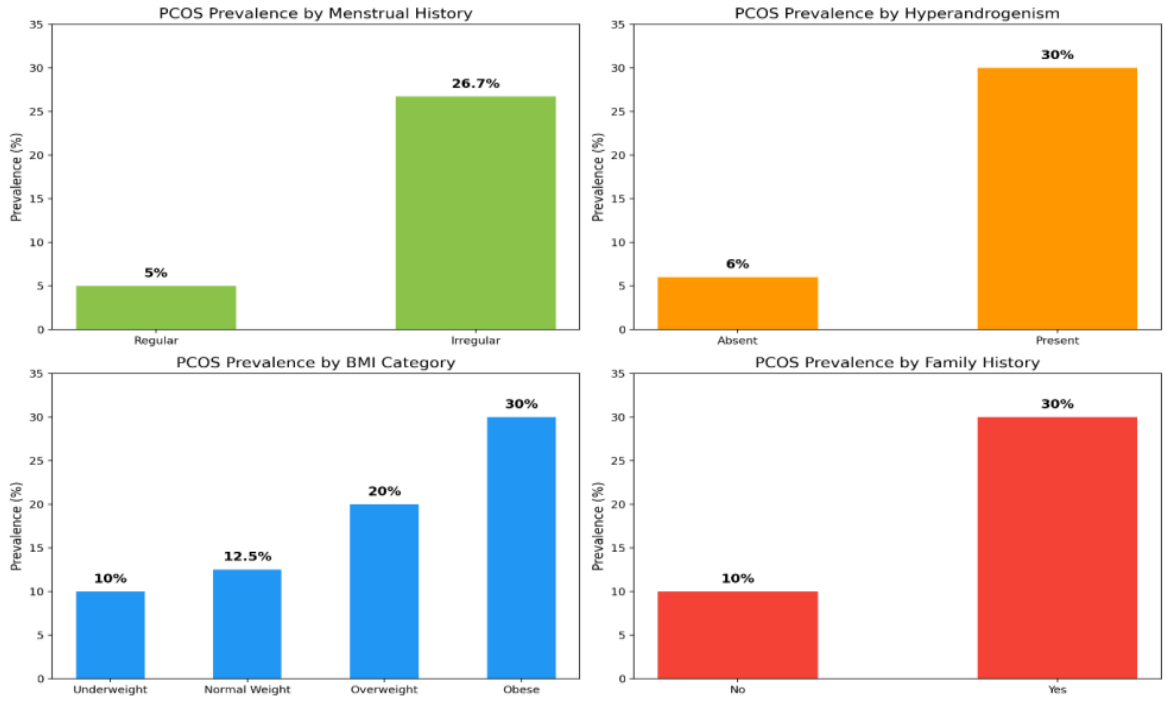
Hyperandrogenism	Present	15	50	30%	Chi-square: 8.1978 p-value: 0.0042
	Absent	3	50	6%	
BMI Category	Underweight	1	10	10%	Chi-square: 3.2859 p-value: 0.3496
	Normal Weight	5	40	12.5%	
	Overweight	6	30	20%	
	Obese	6	20	30%	
Family History	Yes	12	40	30%	Chi-square: 5.2196 p-value: 0.0223
	No	6	60	10%	

Table 5 shows the association between clinical characteristics and PCOS prevalence in the study population. PCOS prevalence is significantly higher in those with irregular menstrual cycles (26.7%) compared to regular cycles (5%) with p=0.0125. Hyperandrogenism is strongly associated with PCOS, showing 30% prevalence in affected individuals versus 6% in those without (p=0.0042). There's a trend of increasing PCOS prevalence with BMI: 10% in underweight, 12.5% in normal weight, 20% in overweight, and 30% in obese adolescents, although this did not reach statistical significance (p=0.3496). A positive family history of PCOS correlates with a threefold higher prevalence (30%) compared to those without (10%) and is statistically significant (p=0.0223). Thus, irregular menstrual cycles, hyperandrogenism, and family history are key factors associated with PCOS in this population.



Discussion

Our study revealed an overall PCOS prevalence of 18% among adolescent girls aged 15-19 years, diagnosed using the Rotterdam criteria. This finding is consistent with the pooled prevalence of 17.74% reported by Sharma et al. 2021 in their systematic review and meta-analysis of Indian adolescent girls (2). The similarity in prevalence rates reinforces the notion that PCOS is a significant health issue affecting a substantial proportion of adolescent girls in India.

However, it's crucial to acknowledge the variability in PCOS prevalence reported in different studies, which often stems from the use of different diagnostic criteria. Sharma et al. 2021 highlighted the lower prevalence rates obtained when employing the NIH (3.39%) and AES (8.03%) criteria compared to the Rotterdam criteria (2). This discrepancy is further supported by Naz et al. 2019, whose meta-analysis emphasized that the choice of diagnostic criteria significantly influences prevalence estimates (1). The Rotterdam criteria, being more inclusive, tend to yield higher prevalence rates, potentially capturing a broader spectrum of phenotypes.

In our study, a majority of participants resided in urban areas (65%), which may have implications for PCOS prevalence due to lifestyle and environmental factors. Balaji et al. 2015 explored urban-rural disparities in the PCOS burden among adolescent girls in India, suggesting that urban environments may be

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associated with increased PCOS risk due to dietary habits and reduced physical activity (8). These findings underscore the need for further investigation into the specific urban-related factors that may contribute to PCOS development.

The clinical characteristics observed in our study, including menstrual irregularities (oligomenorrhea in 35% and amenorrhea in 20%) and hyperandrogenism (hirsutism in 25%), align with typical PCOS presentations as defined by the Rotterdam criteria. An Iranian study on adolescent girls with PCOS by Pourhoseini SA et al. (2022) also reported a high prevalence of menstrual irregularities, further supporting the consistency of our clinical findings (10).

The findings of our study suggested a trend of a higher prevalence of PCOS among younger adolescents and urban residents, and those with higher socioeconomic status, although these associations were not statistically significant. These findings correlate with previous studies that have suggested an association between increased age, urban residence, elevated BMI, family history of diabetes, and the presence of acne with a higher likelihood of PCOS diagnosis (Mehreen et al., 2021) (4).

In our study, irregular menstrual cycles, hyperandrogenism, and family history are key factors associated with PCOS in this population. These findings highlight the importance of clinical evaluation and early interventions. The most common phenotype was oligo-anovulation with hyperandrogenism and polycystic ovaries. These findings are consistent with previous studies conducted on a similar population of adolescent girls. (Desai et al., 2018; Joshi et al., 2014) (5-6).

Limitations of the study:

Our study has several limitations. The relatively small sample size (n=100) limits the generalizability of our findings to the broader population of adolescent girls in India. To confirm our results and explore regional variations in PCOS prevalence, larger multi-center studies are needed. Additionally, the cross-sectional design of our study restricts our ability to establish causal relationships between potential risk factors and the development of PCOS.

Conclusion

In conclusion, our study found an 18% prevalence of PCOS among adolescent girls aged 15-19 years in Jammu, with irregular menstruation and signs of hyperandrogenism as predominant features. Urban residence and family history emerged as potential risk factors. These findings highlight the need for region-specific screening programs and early interventions to mitigate long-term health consequences. Further large-scale studies are recommended to validate these results and explore causal relationships.

References

1. Naz MSG, Tehrani FR, Majd HA, Ahmadi F, Ozgoli G, Fakari FR, et al. The prevalence of polycystic ovary syndrome in adolescents: A systematic review and meta-analysis. Int J Reprod Biomed (IJRM). 2019;17(8):533-42.
2. Sharma M, Khapre M, Saxena V, Kaushal P. Polycystic ovary syndrome among Indian adolescent girls – A systematic review and metanalysis. Nepal J Epidemiol. 2021;11(3):1063-73.
3. Jabeen A, Yamini V, Amberina AR, Eshwar MD, Vadakedath S, Begum GS, et al. polycystic ovarian syndrome: Prevalence, Predisposing Factors, and Awareness Among Adolescent and Young Girls of South India. Cureus. 2022;14(8):e27943.
4. Mehreen TS, Ranjani H, Kamalesh R, Ram U, Anjana RM, Mohan V. Prevalence of Polycystic Ovarian Syndrome Among Adolescents and Young Women in India. J Diabetol. 2021;12(3):319-25.
5. Desai DN, Tiwari RY, Patel PS. Prevalence of Polycystic Ovary Syndrome and its Associated Risk Factors among Adolescent and Young Girls in Ahmedabad Region. Indian J Pharm Pract. 2018;11(3):119-24.
6. Joshi B, Mukherjee S, Patil A, Purandare A, Chauhan S, Vaidya R. A cross-sectional study of polycystic ovarian syndrome among adolescent and young girls in Mumbai, India. Indian J Endocrinol Metab. 2014;18(3):317-24.
7. Bharali MD, Rajendran R, Goswami J, Singal K, Rajendran V. Prevalence of Polycystic Ovarian Syndrome in India: A Systematic Review and Meta-Analysis. Cureus. 2022;14(12):e32351.
8. Balaji S, Amadi C, Prasad S, Kasav JB, Upadhyay V, Singh AK, et al. Urban Rural Comparisons of Polycystic Ovary Syndrome Burden among Adolescent Girls in a Hospital Setting in India. Biomed Res Int. 2015; 2015:158951.
9. Mohammad MB, Seghinsara AM. Polycystic Ovary Syndrome (PCOS), Diagnostic Criteria, and AMH. Asian Pac J Cancer Prev. 2017;18(1):17-21.
10. Pourhoseini SA, Babazadeh R, Mazlom SR. Prevalence of Polycystic Ovary Syndrome in Iranian Adolescent Girls Based on Adults and Adolescents' Diagnostic Criteria in Mashhad City. J ReprodInfertil. 2022;23(4):257-64.