Biological and Clinical Sciences Research Journal
eISSN: 2708-2261; pISSN: 2958-4728
www.bcsrj.com
DOI: https://doi.org/10.54112/bcsrj.v6i4.1642
*Biol. Clin. Sci. Res. J., Volume 6(4), **2025**: 1642*
Original Research Article

Prevalence and Risk Factors of Polycystic Ovary Syndrome (PCOS) Among Adolescent Girls in Urban and Rural Pakistan

Maham Aslam[*1], Hira Iqbal[2], Shumaila Jabeen[3]

[1]*Deparment of Obs & Gynae, Jamila Fareedi Medical Center, Lahore, Pakistan*
[2]*Deparment of Obs & Gynae, Fatima Jinnah Hospital, Multan, Pakistan*
[3]*Deparment of Obs & Gynae, Dallah Hospital Namar Riyadh, KSA*
**Corresponding author`s email address:* mahamaslamrao@yahoo.com

(Received, 24th November 2024, Accepted 10th April 2025, Published 30th April 2025)

Abstract: *Polycystic Ovary Syndrome (PCOS) is a common endocrine disorder affecting females during adolescence and reproductive years, with increasing prevalence in South Asia. This study aimed to determine the prevalence of PCOS and identify associated clinical and lifestyle risk factors among adolescent girls in urban and rural areas of Pakistan.* ***Methods:*** *A cross-sectional study was conducted at Jamila Fareedi Medical Center in Pakistan from April to September 2024. Eighty-six adolescent girls aged 13–19 were recruited from urban and rural settings. PCOS was diagnosed based on the Rotterdam criteria. Clinical assessments included anthropometric measurements, menstrual history, signs of hyperandrogenism, and lifestyle factors. Biochemical investigations included levels of LH, FSH, testosterone, and insulin. Insulin resistance was calculated using HOMA-IR. Data were analyzed using SPSS v26, with $p < 0.05$ considered statistically significant.* ***Results:*** *The overall prevalence of PCOS was 26.7%, with a higher prevalence among urban girls (34.1%) compared to rural girls (19.0%). PCOS was significantly associated with a higher BMI ($p = 0.02$), physical inactivity ($p = 0.01$), frequent consumption of junk food ($p = 0.006$), sleep deprivation ($p = 0.01$), and an elevated LH: FSH ratio ($p < 0.001$). Hirsutism, acne, and menstrual irregularities were more prevalent in the PCOS group. Insulin resistance (HOMA-IR > 2.5) was observed in 60.9% of patients with PCOS compared to 17.5% of non-PCOS participants.* ***Conclusion:*** *PCOS is prevalent among adolescent girls in Pakistan, particularly in urban areas, and is strongly associated with modifiable lifestyle and metabolic risk factors. Early screening, education, and targeted interventions are urgently needed to prevent long-term reproductive and metabolic complications.*

Keywords: Polycystic ovary syndrome, Adolescents, Urban-rural disparity, Lifestyle, Pakistan, Insulin resistance

[***How to Cite:*** Aslam M, Iqbal H, Jabeen S. Prevalence and risk factors of polycystic ovary syndrome (PCOS) among adolescent girls in urban and rural Pakistan. *Biol. Clin. Sci. Res. J.*, **2025;** 6(4): 50-53. doi: https://doi.org/10.54112/bcsrj.v6i4.1642

Introduction

Polycystic Ovary Syndrome (PCOS) is the most prevalent endocrine disorder affecting females of reproductive age, with manifestations often beginning in adolescence. It is characterized by a constellation of signs and symptoms including hyperandrogenism, chronic anovulation, and polycystic ovarian morphology, as defined by the Rotterdam criteria (1). Globally, the estimated prevalence of PCOS ranges from 6% to 20%, depending on diagnostic criteria and population characteristics (2). However, in South Asia—particularly Pakistan—the prevalence is reportedly higher due to genetic predisposition, lifestyle changes, and environmental factors (3, 4).

In Pakistan, the rising burden of PCOS among adolescent girls is a growing public health concern, yet remains underdiagnosed and undertreated. Recent studies conducted in urban Pakistani settings report prevalence rates between 20% and 30%, with higher incidence among girls with sedentary lifestyles, poor dietary habits, and a positive family history of PCOS (5, 6). These figures are alarming, considering the long-term complications of PCOS, which include infertility, insulin resistance, type 2 diabetes, cardiovascular disease, and psychological disorders such as anxiety and depression (7).

Adolescence is a critical window for the development and early manifestation of PCOS. However, the diagnosis in this age group is often challenging due to overlapping features of normal pubertal development and the lack of specific screening guidelines. In resource-constrained countries like Pakistan, diagnostic delays are further exacerbated by limited awareness among adolescents, inadequate access to gynecological care, and cultural taboos surrounding reproductive health discussions (8,9). Moreover, disparities in health outcomes between urban and rural populations remain stark, with urban adolescents often experiencing higher rates of obesity and metabolic disorders. In contrast, rural populations often face limited access to healthcare and inadequate health education (10, 11).

While most published data on PCOS in Pakistan focus on adult women in urban centers, there is an apparent paucity of studies examining its prevalence and risk factors among adolescent girls across different geographic regions. Understanding these patterns is crucial to developing early prevention strategies, especially given the modifiable nature of many PCOS risk factors. Identifying lifestyle behaviors such as physical inactivity, excessive screen time, junk food consumption, and inadequate sleep can help shape community-based interventions aimed at reducing disease burden and improving reproductive health outcomes in young girls.

This study aims to assess the prevalence of PCOS among adolescent girls in both urban and rural regions of Pakistan and to identify associated clinical, biochemical, and lifestyle risk factors. By addressing this gap, the study hopes to contribute to the development of targeted awareness programs and early intervention strategies for PCOS in adolescent populations.

Methodology

This cross-sectional analytical study was conducted over six months, from April 2024 to September 2024, at Jamila Fareedi Medical Center. The primary objective was to determine the prevalence and risk factors associated with Polycystic Ovary Syndrome (PCOS) among adolescent girls in both urban and rural regions. Eighty-six teenage girls, aged 13 to 19 years, were enrolled in the study using a non-probability, purposive sampling technique. Participants were recruited from urban and rural

outpatient departments affiliated with the hospital to ensure representation of both populations.

Eligibility criteria included adolescent girls presenting with menstrual irregularities, signs of hyperandrogenism (e.g., hirsutism, acne), or suspected PCOS based on clinical features. Those with known endocrine disorders such as thyroid dysfunction, congenital adrenal hyperplasia, or Cushing's syndrome were excluded to minimize diagnostic overlap. Informed written consent was obtained from all participants and their guardians before inclusion in the study, and the hospital's Institutional Review Board granted ethical approval.

All participants underwent a detailed clinical assessment that included demographic information, anthropometric measurements (height, weight, BMI), menstrual history, and evaluation of hirsutism using the modified Ferriman-Gallwey score. Acne and other signs of hyperandrogenism were also documented. A structured questionnaire assessed lifestyle-related risk factors, including dietary habits, frequency of junk food intake, physical activity levels, screen time, and sleep duration.

A transabdominal pelvic ultrasound was performed to evaluate ovarian morphology. Laboratory investigations included serum levels of luteinizing hormone (LH), follicle-stimulating hormone (FSH), total testosterone, and fasting insulin. The Homeostatic Model Assessment for Insulin Resistance (HOMA-IR) was calculated to assess insulin sensitivity. PCOS was diagnosed based on the revised Rotterdam criteria, requiring at least two of the following three: oligo/anovulation, clinical or biochemical hyperandrogenism, and polycystic ovarian morphology on ultrasound.

All data were entered into SPSS version 26 for statistical analysis. Descriptive statistics were used to calculate means, standard deviations, frequencies, and percentages. Chi-square tests and independent t-tests were applied to identify associations between PCOS and potential risk factors. A p-value of less than 0.05 was considered statistically significant. The study adhered to international ethical guidelines and ensured participant confidentiality throughout the research process.

Results

This study assessed the prevalence and associated risk factors of PCOS among adolescent girls in urban and rural regions of Pakistan, using a sample size of 86 participants. Diagnosis was based on the Rotterdam criteria, and data were analyzed to compare demographic, clinical, and lifestyle variables between affected and unaffected individuals. Urban adolescents had a slightly higher BMI and a greater prevalence of overweight status and family history of PCOS compared to their rural counterparts, indicating environmental and lifestyle influences. (Table 1)

The overall prevalence of PCOS among adolescent girls in this study was 26.7%, with a significantly higher prevalence in urban areas (34.1%) compared to rural areas (19.0%). (Table 2)

Adolescents diagnosed with PCOS had significantly higher rates of clinical symptoms (hirsutism, acne, irregular menses) and biochemical abnormalities such as elevated LH: FSH ratio and insulin resistance, consistent with diagnostic criteria. (Table 3)

Lifestyle factors such as physical inactivity, frequent junk food intake, prolonged screen time, and poor sleep duration were significantly associated with the presence of PCOS, particularly among urban adolescents. (Table 4)

This study's overall prevalence of PCOS was 26.7%, higher among urban adolescents (34.1%) than rural adolescents (19.0%). Overweight status and family history were more common in PCOS cases, with lifestyle risk factors significantly contributing to disease expression. Clinical and biochemical features strongly correlated with PCOS diagnosis, supporting the utility of the Rotterdam criteria in adolescent screening. Early identification and targeted lifestyle interventions are crucial to address the growing burden of PCOS in Pakistani adolescents.

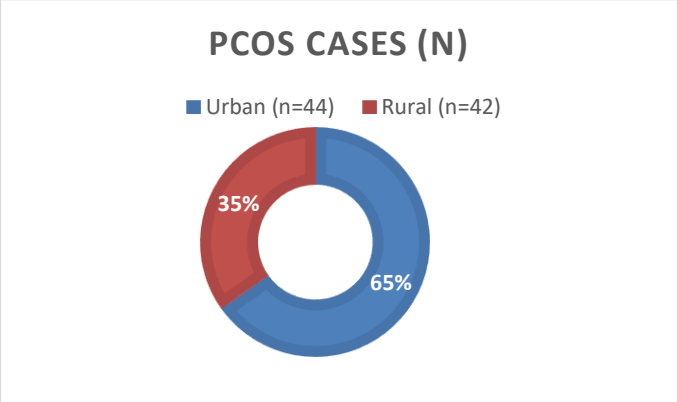

Figure 1: Frequencies of PCOS in both groups

Table 1: Demographic Characteristics of Participants (n = 86)

Variable	Urban (n=44)	Rural (n=42)	Total (n=86)
Mean Age (years ± SD)	16.2 ± 1.1	16.4 ± 1.3	16.3 ± 1.2
Mean BMI (kg/m² ± SD)	25.6 ± 3.4	23.8 ± 3.7	24.7 ± 3.6
Overweight (BMI > 25)	24 (54.5%)	15 (35.7%)	39 (45.3%)
Family History of PCOS	18 (40.9%)	10 (23.8%)	28 (32.6%)

Table 2: Prevalence of PCOS Among Participants

Region	PCOS Cases (n)	Prevalence (%)
Urba(n=44)	15	34.1%
Rural (n=42)	8	19.0%
Total (n=86)	23	26.7%

Table 3: Clinical and Biochemical Features of PCOS vs. Non-PCOS Groups

Feature	PCOS (n=23)	Non-PCOS (n=63)	p-value
Mean Menstrual Cycle Length (days)	43.5 ± 6.8	30.1 ± 3.4	<0.001*
Hirsutism (Modified Ferriman Score >8)	17 (73.9%)	5 (7.9%)	<0.001*
Acne	16 (69.6%)	21 (33.3%)	0.002*
Elevated LH: FSH Ratio (>2)	19 (82.6%)	9 (14.3%)	<0.001*
Insulin Resistance (HOMA-IR >2.5)	14 (60.9%)	11 (17.5%)	<0.001*

Table 4: Lifestyle Factors and PCOS Risk (n=86)

Factor	PCOS (n=23)	Non-PCOS (n=63)	p-value
Physical Inactivity	16 (69.6%)	24 (38.1%)	0.01*
Junk Food Consumption (>3x/week)	18 (78.3%)	29 (46.0%)	0.006*
Screen Time > 3 hours/day	15 (65.2%)	26 (41.3%)	0.04*
Sleep < 6 hours/day	11 (47.8%)	13 (20.6%)	0.01*

Discussion

This study found the overall prevalence of Polycystic Ovary Syndrome (PCOS) among adolescent girls to be 26.7%, with a significantly higher prevalence observed in urban populations (34.1%) compared to rural populations (19.0%). These findings align with recent Pakistani and regional studies that have reported a growing burden of PCOS in adolescent populations, particularly in urban areas where sedentary lifestyles, obesity, and dietary changes are more prevalent (12, 13).

Our findings are comparable to a study conducted by Nisar and Sohoo, who reported a PCOS prevalence of approximately 28% among adolescent girls in Sindh, Pakistan, based on similar diagnostic criteria (14). Similarly, Ahmed et al. documented a prevalence of 27.3% in urban high school students in Lahore, which supports the notion that urbanization is associated with increased risk due to lifestyle and environmental factors (15).

Obesity was found to be more prevalent among urban participants and significantly associated with PCOS in our cohort. This is consistent with the global understanding that increased BMI is a significant risk factor for PCOS due to its role in exacerbating insulin resistance and hormonal imbalances (16). The mean BMI of the PCOS group in our study (26.1 ± 3.2 kg/m²) was higher than that of the non-PCOS group (23.3 ± 3.7 kg/m²), reinforcing the link between adiposity and endocrine disruption during adolescence.

Clinical features such as hirsutism, acne, and menstrual irregularities were significantly more common among PCOS patients, which is in line with the diagnostic criteria and pathophysiological mechanisms underlying hyperandrogenism. Similar patterns have been reported in earlier studies from Pakistan and other South Asian populations, emphasizing the need for early recognition of these signs in adolescents to prevent long-term reproductive and metabolic consequences (17, 18). Additionally, most PCOS cases in our study demonstrated elevated LH: FSH ratios and insulin resistance (HOMA-IR > 2.5), further supporting the metabolic underpinning of the syndrome.

Lifestyle behaviors such as frequent junk food consumption, physical inactivity, excessive screen time, and reduced sleep were also significantly associated with PCOS in our study. These associations have been observed in other regional studies as well, including research by Asim et al., who linked increased fast food intake and low physical activity to the rising incidence of PCOS among adolescent girls in urban Punjab (19). Moreover, a recent study by Fatima et al. highlighted poor sleep patterns as a contributory factor in hormonal disruption and PCOS development in teenagers (20).

The observed urban-rural disparity in PCOS prevalence may also reflect differences in health literacy, access to care, and socio-cultural practices. Urban adolescents are more likely to seek medical consultation for menstrual irregularities, leading to increased detection. At the same time, rural girls may underreport symptoms due to stigma or limited access to gynecological care (21). This suggests that awareness and screening programs should be tailored to address these regional differences.

Our study adds to the limited body of literature on PCOS in adolescents in Pakistan, highlighting the high burden and modifiable nature of risk factors. However, the study is limited by its sample size and cross-sectional design, which precludes causality. Further large-scale, multi-centered, longitudinal studies are warranted to understand the progression of PCOS and the effectiveness of early interventions in the Pakistani population.

Conclusion

This study confirms a high prevalence of PCOS among Pakistani adolescent girls, especially in urban settings, with clear links to obesity, sedentary behavior, and poor dietary habits. Early lifestyle interventions, awareness campaigns, and routine screening in schools and primary care can play a vital role in reducing the burden of PCOS and its long-term health consequences.

Declarations

Data Availability statement

All data generated or analysed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department concerned. (IRBEC-JFMC-02121-24)

Consent for publication

Approved

Funding

Not applicable

Conflict of interest

The authors declared the absence of a conflict of interest.

Author Contribution

MA (Medical Officer)
Manuscript drafting, Study Design,
Review of Literature, Data entry, Data analysis, and article drafting.
HI (WMO)
Conception of Study, Development of Research Methodology Design, Study Design, manuscript review, and critical input.
SJ
Article drafting, Development of Research Methodology Design, proof reading

All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the integrity of the study.

References

1. Teede HJ, Misso ML, Costello MF, et al. Recommendations from the international evidence-based guideline for assessing and managing polycystic ovary syndrome. Hum Reprod. 2018;33(9):1602–18.
2. Bozdag G, Mumusoglu S, Zengin D, et al. The prevalence and phenotypic features of polycystic ovary syndrome: a systematic review and meta-analysis. Hum Reprod. 2016;31(12):2841–55.
3. Nisar N, Sohoo NA. Frequency of polycystic ovary syndrome (PCOS) and its associated risk factors among female medical students of a public sector university in Pakistan. J Ayub Med Coll Abbottabad. 2019;31(4):602–6.
4. Asim M, Nawaz M, Iftikhar A, et al. Lifestyle risk factors associated with PCOS among undergraduate students in Lahore. J Pak Med Assoc. 2020;70(5):843–7.
5. Kausar S, Gull S, Haider J, et al. Polycystic ovary syndrome and its association with body mass index among adolescent girls in Pakistan. Rawal Med J. 2021;46(3):670–4.
6. Ahmed K, Javed A, Farooq N. Prevalence of PCOS in young women and its association with BMI and lifestyle factors in urban Pakistan. Pak J Med Health Sci. 2020;14(4):692–6.
7. Jabeen R, Rehman R, Mehmood K, et al. The psychological impact of polycystic ovary syndrome on adolescent girls in Pakistan. Cureus. 2021;13(7):e16310.
8. Saeed M, Batool Z, Ali R, et al. Knowledge and awareness regarding PCOS among female adolescents in rural Pakistan. Int J Adolesc Med Health. 2022;34(1):1–6.
9. Shamsher S, Fatima N, Iqbal F. Barriers to PCOS diagnosis and treatment in Pakistan: a qualitative study. J Coll Physicians Surg Pak. 2021;31(11):1277–81.
10. Fatima SS, Rehman R. Urban-rural disparity in health literacy and PCOS awareness among adolescent girls in Pakistan. BMC Public Health. 2020;20(1):501.
11. Khalid A, Malik T, Naeem N. Comparison of PCOS prevalence and lifestyle factors in urban and rural adolescent girls. J Pak Med Assoc. 2021;71(9):2132–6.

12. Kausar S, Gull S, Haider J, et al. Polycystic ovary syndrome and its association with body mass index among adolescent girls in Pakistan. Rawal Med J. 2021;46(3):670–4.
13. Khalid A, Malik T, Naeem N. Comparison of PCOS prevalence and lifestyle factors in urban and rural adolescent girls. J Pak Med Assoc. 2021;71(9):2132–6.
14. Nisar N, Sohoo NA. Frequency of PCOS and associated risk factors among female medical students of a public sector university in Pakistan. J Ayub Med Coll Abbottabad. 2019;31(4):602–6.
15. Ahmed K, Javed A, Farooq N. Prevalence of PCOS in young women and its association with BMI and lifestyle factors in urban Pakistan. Pak J Med Health Sci. 2020;14(4):692–6.
16. Teede HJ, Misso ML, Costello MF, et al. Recommendations from the international evidence-based guideline for assessing and managing polycystic ovary syndrome. Hum Reprod. 2018;33(9):1602–18.
17. Rehman R, Jabeen R, Mehmood K. Clinical presentation of PCOS and its impact on adolescent girls' quality of life in Pakistan. Cureus. 2021;13(7):e16310.
18. Gulzar R, Mushtaq R, Arif S. Menstrual irregularities and associated symptoms in adolescent girls with PCOS in Punjab, Pakistan. Int J Adolesc Med Health. 2020;32(6):1–6.
19. Asim M, Nawaz M, Iftikhar A, et al. Lifestyle risk factors associated with PCOS among undergraduate students in Lahore. J Pak Med Assoc. 2020;70(5):843–7.
20. Fatima SS, Rehman R. Sleep duration and lifestyle as emerging risk factors for adolescent PCOS in Pakistan. BMC Public Health. 2020;20(1):1451.
21. Shamsher S, Fatima N, Iqbal F. Barriers to PCOS diagnosis and treatment in Pakistan: a qualitative study. J Coll Physicians Surg Pak. 2021;31(11):1277–81.