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Original Research Article

Urban Vs Rural Comparison of Adolescent PCOS in Terms of Onset, Symptoms and Hormonal Levels

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Abstract:

Background: Polycystic Ovary Syndrome (PCOS) is a prevalent endocrine disorder affecting adolescent girls, characterized by hyperandrogenism, ovulatory dysfunction, and polycystic ovarian morphology. The syndrome poses significant health risks, including infertility, metabolic syndrome, and cardiovascular diseases, with varying impacts between urban and rural population.

Aim: This study aims to analyze the onset, symptoms, and hormonal levels associated with adolescent PCOS in urban and rural areas, focusing on differences in prevalence, clinical presentation, and healthcare access.

Methods: A comparative cross-sectional study was conducted over one year at Patna Medical College & Hospital, Patna. A total of 160 adolescent females diagnosed with PCOS (80 rural, 80 urban) were included. Data were collected on the age of onset, family history, symptoms (oligo/amenorrhoea, infertility), and hormonal levels (prolactin, FSH, LH, SHBG, testosterone). Statistical analysis was performed using SPSS version 23.0, employing t-tests, chi-square tests, and Mann-Whitney U tests as appropriate.

Results: The study found no significant differences in the mean age of onset, family history, or hormonal levels between urban and rural participants. The prevalence of oligo/amenorrhoea was slightly higher in urban areas (75% vs. 68.8%), and infertility was slightly more common in rural areas (25% vs. 18.8%), but these differences were not statistically significant. Hormonal profiles, including levels of prolactin, FSH, LH, SHBG, and testosterone, were similar across both groups.

Conclusion: The findings suggest that geographic location (urban vs. rural) does not significantly influence the clinical presentation or hormonal profile of adolescent girls with PCOS. Both groups exhibited similar symptoms and hormonal imbalances, indicating that other factors, such as lifestyle and genetic predisposition, may play a more critical role.

Recommendations: Future research should focus on larger sample sizes and longitudinal studies to better understand the environmental and lifestyle factors influencing PCOS. Improved public health interventions and educational programs are essential to address the healthcare disparities between urban and rural settings.

Keywords: Polycystic Ovary Syndrome (PCOS), Adolescents, Urban vs. Rural, Hormonal Levels, Healthcare Disparities.

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Introduction

Polycystic Ovary Syndrome (PCOS) is a prevalent endocrine disorder affecting adolescent girls and women of reproductive age. It is characterized by hyperandrogenism, ovulatory dysfunction, and polycystic ovarian morphology. The syndrome is associated with various symptoms, including menstrual irregularities, hirsutism, acne, and obesity, which can significantly impact the quality of life and long-term health outcomes of those affected. Recent research has continued to shed light on the complex etiology and heterogeneous clinical presentation of PCOS, highlighting the interplay of genetic, environmental, and lifestyle factors [1].

Recent studies have focused on the differences in the burden of PCOS between urban and rural populations, given their distinct environmental and lifestyle contexts. Urbanization and associated lifestyle changes, such as increased sedentary behaviour and altered dietary patterns, have been linked to a higher prevalence of PCOS. For instance, it was found a greater incidence of PCOS among urban adolescents compared to their rural

counterparts in India, suggesting that urban environments may exacerbate risk factors for the development of PCOS. Similarly, a Canadian study highlighted that environmental factors and lifestyle choices significantly impact the manifestation and management of PCOS [2, 3].

The management of PCOS also varies significantly between urban and rural settings. Urban adolescents typically have better access to healthcare resources, facilitating earlier diagnosis and intervention. In contrast, rural adolescents often face barriers such as limited healthcare facilities, lack of awareness, and cultural stigmas, which can delay diagnosis and treatment. This disparity in healthcare access underscores the need for targeted public health interventions and education programs to improve PCOS management in underserved areas [4].

Recent advancements in PCOS research have focused on understanding the genetic and molecular mechanisms underlying the syndrome and exploring new diagnostic biomarkers and therapeutic approaches. Elevated androgen levels and insulin resistance remain central to the pathophysiology of PCOS, highlighting the importance of comprehensive hormonal and metabolic evaluations in affected individuals. Innovative treatments, including lifestyle modifications, pharmacotherapy, and potentially novel therapeutic agents, are being investigated to improve the management and quality of life for adolescents with PCOS [5].

PCOS continues to pose a significant health challenge for adolescent girls, with distinct differences in its burden and management between urban and rural populations. Enhanced understanding of these disparities and ongoing research into the underlying mechanisms and optimal management strategies are crucial for improving health outcomes for all individuals affected by PCOS. Further studies are needed to develop targeted interventions and ensure equitable healthcare access across different populations.

This study ensures a comprehensive analysis of the differences in the onset, symptoms, and hormonal profiles of adolescent PCOS in urban and rural settings.

Methodology

Study Design: This is a comparative cross-sectional study designed to analyze the onset, symptoms, and hormonal levels of adolescent Polycystic Ovary Syndrome (PCOS) in urban and rural areas.

Study Setting: The study was conducted at Patna Medical College and hospital, Patna from April 2010 to March 2011

Participants: The study included a total of 160 adolescent females diagnosed with PCOS. Rural and urban groups were assigned according to address.

Inclusion Criteria:

- Adolescent females aged 13-19 years

- Diagnosed with PCOS based on the Rotterdam criteria (at least two of the following: oligo/anovulation, clinical/biochemical signs of hyperandrogenism, polycystic ovaries)

Exclusion Criteria:

- Individuals with thyroid dysfunction, hyperprolactinemia, or congenital adrenal hyperplasia

- Those currently on medications affecting hormonal levels

- Participants with chronic illnesses or conditions impacting reproductive health

Bias: To minimize selection bias, participants will be randomly selected from the outpatient departments of the respective hospitals. Efforts will be made to ensure equal representation of age groups within the adolescent range.

Data Collection: Data will be collected through:

- Medical History: Documentation of the age of onset of symptoms, family history of PCOS or related conditions

- Clinical Examination: Assessment of symptoms like oligo/amenorrhoea and infertility

-Laboratory Tests: Measurement of hormone levels (prolactin, FSH, LH, SHBG, testosterone)

Procedure

1. Recruitment: Eligible participants were recruited from the outpatient departments.

2. Informed Consent: Written informed consent were obtained from participants and their guardians.

3. History and Examination: Detailed history taking and clinical examination was conducted.

4. Blood Sampling: Blood samples were collected for hormonal analysis.

5. Data Entry: All collected data were recorded in a standardized format.

Statistical Analysis: SPSS version 23.0 was used for data entry and analysis. The clinical features and demographic information were compiled using descriptive statistics. To compare the hormone levels between the rural and urban groups, independent t-tests or Mann-Whitney U tests were used. To compare categorical variables, including

the existence of symptoms (oligo/amenorrhea, infertility), chi-square tests were employed. A statistically significant p-value was one that was less than 0.05.

Results

Participant Demographics: A total of 160 participants were included in the study, with 80 from rural areas and 80 from urban areas

Table 1: Demographic and Clinical Characteristics of Participants

Characteristic	Rural (n=80)	Urban (n=80)	p-value
Mean Age (years)	16.2 ± 1.8	15.9 ± 1.7	0.318
Age of Onset (years)	14.0 ± 1.5	13.8 ± 1.6	0.491
Family History of PCOS (%)	50% (40/80)	43.8% (35/80)	0.432
Oligo/amenorrhoea (%)	68.8% (55/80)	75% (60/80)	0.372
Infertility (%)	25% (20/80)	18.8% (15/80)	0.337

Table 2: Hormonal Levels in Participants

Hormone	Rural (n=80)	Urban (n=80)	p-value
Prolactin (ng/mL)	16.2 ± 4.3	15.9 ± 4.1	0.674
FSH (mIU/mL)	5.5 ± 1.8	5.3 ± 1.7	0.518
LH (mIU/mL)	12.1 ± 3.5	12.3 ± 3.7	0.791
SHBG (nmol/L)	45.2 ± 8.9	43.7 ± 9.2	0.281
Testosterone (ng/dL)	68.4 ± 15.2	67.9 ± 14.8	0.832

Statistical Analysis

- Age of Onset: There was no significant difference in the mean age of onset of PCOS symptoms between rural (14.0 ± 1.5 years) and urban (13.8 ± 1.6 years) participants (p=0.491).
- Family History: The proportion of participants with a family history of PCOS was slightly higher in rural areas (50%) compared to urban areas (43.8%), but this difference was not statistically significant (p=0.432).
- Symptoms: The prevalence of oligo/amenorrhoea was higher in urban participants (75%) compared to rural participants (68.8%), although this difference was not statistically significant (p=0.372). The prevalence of infertility was slightly higher in rural participants (25%) compared to urban participants (18.8%), but this difference was also not statistically significant (p=0.337).
- Hormonal Levels: There were no significant differences in the mean levels of prolactin, FSH, LH, SHBG, and testosterone between rural and urban participants (all p-values > 0.05).

Discussion

The study comprised 160 adolescent females with PCOS, split evenly between rural and urban.. Participants' average ages were similar across rural (16.2 ± 1.8 years) and urban (15.9 ± 1.7 years), with no significant difference found (p=0.318). The age of onset of PCOS symptoms was similar across the two groups (14.0 ± 1.5 years for rural and 13.8 ± 1.6 years for urban, p=0.491). Furthermore, rural areas had a slightly greater number of participants with a family history of PCOS (50%) than urban areas (43.8%), but this difference was not statistically significant (p=0.432).

The prevalence of oligo/amenorrhoea was higher in urban participants (75%) than in rural ones (68.8%), but the difference was not statistically significant (p=0.372). Similarly, the rural group had a somewhat greater prevalence of infertility (25%) than the urban group (18.8%), but the difference was not statistically significant (p=0.337). These findings indicate that the incidence of these symptoms is rather consistent in both rural and urban settings.

The hormonal profiles of the participants were analyzed, with measurements of prolactin, FSH, LH, SHBG, and testosterone levels. The results showed no significant differences in the levels of these hormones between rural and urban participants. Specifically, prolactin levels were 16.2 ± 4.3 ng/mL in rural participants and 15.9 ± 4.1 ng/mL in urban participants (p=0.674). FSH levels were 5.5 ± 1.8 mIU/mL in the rural group and 5.3 ± 1.7 mIU/mL in the urban group (p=0.518). LH levels were 12.1 ± 3.5 mIU/mL for rural participants and 12.3 ± 3.7 mIU/mL for urban participants (p=0.791). SHBG levels were 45.2 ± 8.9 nmol/L in the rural group and 43.7 ± 9.2 nmol/L in the urban group (p=0.281). Testosterone levels were 68.4 ± 15.2 ng/dL in rural participants and 67.9 ± 14.8 ng/dL in urban participants (p=0.832).

These findings suggest that other factors, including as lifestyle, diet, and genetic predispositions, may have a greater influence in the clinical presentation of PCOS than the urban-rural gap. Additional studies with larger sample sizes and more extensive data on the environment and lifestyle.

A research of adolescent girls in Puducherry found that urban girls are more likely to develop PCOS, which is associated with a higher Body Mass Index (BMI) and dietary trends. This study discovered a substantial link between PCOS risk and a family history of the syndrome, highlighting the genetic and environmental factors on PCOS development [6].

Hormonal abnormalities play a significant role in PCOS pathogenesis. Adolescent girls with PCOS have higher amounts of luteinizing hormone (LH), anti-Müllerian hormone (AMH), and androgens, but lower levels of estradiol and osteocalcin than healthy controls. These hormonal changes lead to PCOS clinical symptoms as well as possible long-term consequences such osteoporosis [7].

Polycystic Ovary Syndrome (PCOS) has varied frequency and symptoms among adolescent females in urban and rural locations. According to studies, PCOS is more common in metropolitan areas, which can be ascribed to lifestyle variations such as increased obesity rates, poor diet, and reduced physical activity levels. Urban girls have a higher prevalence of PCOS symptoms than their rural counterparts. The chief symptoms include hirsutism, acne, irregular menstrual periods, and infertility, which are frequently accompanied by high levels of testosterone and insulin resistance [8].

Conclusion

The onset, symptoms, and hormonal levels of adolescent PCOS were not significantly different in rural and urban populations, according to this comparative cross-sectional study. The prevalence of oligo/amenorrhea was somewhat greater in urban participants, whereas the prevalence of infertility was slightly higher in rural people; however, these differences did not reach statistical significance. The hormonal profiles of adolescents with PCOS were comparable in both contexts, suggesting that geographic location (rural vs. urban) may not have a significant influence on how PCOS manifests clinically in teenagers.

These findings indicate that more research is necessary to fully comprehend the possible influence of lifestyle and environmental factors on the clinical presentation of PCOS in various groups. Specifically, larger sample sizes and longitudinal designs are needed.

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