



URBAN AND RURAL COMPARISON OF POLYCYSTIC OVARIAN SYNDROME AMONG ADOLESCENT GIRLS IN KONKAN AREA OF MAHARASHTRA

Obstetrics & Gynaecology

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ABSTRACT

AIM: The aim of this study was to determine urban and rural differences in the burden of polycystic ovarian syndrome among Indian adolescent females aged 12 to 19 years. **Methods:** The present study was conducted on 100 participants at BKL Walawalkar Rural Hospital, Ratnagiri, Maharashtra. Patients were from various urban (50%) and rural (50%) settings. All the demographic and clinical parameters were compared. **Results:** 22% participants were confirmed of having PCOS. Mean age was 18.6 ± 3.1 years. Average waist-hip ratio of rural participants was higher than urban participants (p value < 0.05). 56% urban participants reported recent weight gain in past 3 months (p value < 0.05). The urban study participants had higher frequency of excess androgen activity (61%, p value < 0.05). **Conclusion:** The proportion of PCOS, weight gain, excess androgen activity was higher among urban participants in comparison to rural participants.

KEYWORDS

Polycystic Ovarian Syndrome (PCOS), Adolescent Girls, Urban And Rural Comparison, Androgen Activity.

INTRODUCTION:

Polycystic ovarian syndrome, often called PCOS, is defined by the National Institute of Health & Rotterdam criteria. It's a hormonal disorder that shows up when there's at least one polycystic ovary (meaning lots of cysts) along with issues like ovulatory dysfunction & too many androgens⁽¹⁾. Now, when it comes to diagnosing PCOS in women, there's been some agreement on how different it should be for teens compared to adults. For teenagers, it's suggested that all three elements of the Rotterdam criteria should be considered. This includes having irregular periods (oligomenorrhea) after two years post-menarche or not starting periods (primary amenorrhea) by age 16. Also, there should be evidence of polycystic ovaries on an ultrasound, with the ovaries being larger than 10cm³, plus signs of high androgen levels (hyperandrogenemia)⁽²⁾.

So basically, it's like this: if a teen girl has been waiting for her period for a couple of years but it's still irregular beyond that mark or hasn't started by 16 years old, combined with larger-than-usual ovaries full of cysts & too much androgen floating around – that's when doctors consider PCOS⁽³⁾. The reasons behind polycystic ovarian syndrome (PCOS) are to both genetic and environmental causes. Now, some of the genetic includes early sexual maturation, early fetal development, & having family members with PCOS. Research shows that girls diagnosed with PCOS at around 9-12 years old often hit puberty sooner than those diagnosed later at 13-18 years old. This is because of increased androgen hormones when puberty starts early⁽⁴⁾.

So, what happens during premature fetal development? Well, it leads to faster onset of puberty and increases the chances of PCOS popping up. Plus, kids of women who have PCOS might show symptoms like high insulin levels even before hitting puberty⁽⁵⁾. This really highlights how important family history can be. So, we've seen a bunch of studies talking about how common PCOS is among Indian teens. But here's the kicker: nobody's really looked into whether there's a big difference between those living in busy cities versus quieter rural of Konkan. We think that teenagers in villages might have less of this PCOS thing compared to their city-living friends.

This could mean that starting early with some lifestyle tips might help prevent PCOS and other related health issues, depending on where you live. The aim of this study was to determine urban rural differences in the burden of polycystic ovarian syndrome among adolescent females aged 12 to 19 years.

MATERIALS AND METHODS:

This present cross-sectional study was conducted at a BKL Walawalkar Rural medical college and hospital, Dervan, Ratnagiri, Maharashtra for a period of one year. Study was started after getting approval from Institutional Ethical Committee. The study participants

enrolled constituted patients visiting this hospital from Ratnagiri district (an urban setting) and other surrounding villages of Dervan area (rural settings). Adolescent girls of age between 12- and 19-years having complaints of menstrual disorders and living in urban and rural settings respectively were included.

Patients with mental and physical challenges or were not willing to participate in the study were excluded from study. Equal number of urban ($n = 50$) and rural ($n = 50$) participants were enrolled with a total of 100 participants. All participants were enrolled after obtaining informed consent or assent to participate in the study. All of the study participants were interviewed in a separate place from the clinician's office for maintaining participant's confidentiality.

Information about the variables was gathered by using set of semi-structured questionnaires Clinical history, Menstrual history, Physical Activity, details of Socio-demographic variables (age, educational status, family structure, occupation, marital status, parity, family income) and anthropometric assessment (like height, weight, waist circumference and hip circumference), non-invasive sonographic scanning and biochemical examination (Prolactin, Testosterone, T3, T4 and TSH) was done to identify polycystic ovaries. As per the new guidelines, clinical manifestations have major role in diagnosing PCOS so FSH and LH were not done in the present study. Physical activity was self-reported based on the type of activity (i.e., walking, running, and playing football), intensity levels (minutes/ hours/days), and the length of time spent on each activity. Participants were evaluated for PCOS on the guidelines of Rotterdam Consensus on women health aspect of PCOS. Hirsutism score of more than 8 was considered positive for hyper-androgenemia.

Descriptive statistics were computed for various continuous and categorical variables and were reported as means, standard deviations, and percentage distributions. Statistics and chi-square statistics were used to compare means and percentage distribution among continuous and categorical variables. Data were analysed using IBM SPSS statistical software version 26.

DEMOGRAPHIC CHARACTERISTICS OF THE PARTICIPANTS:

The average age of the adolescent girls was 16.1 ± 1.9 years. There was minimal difference between the age of urban and rural participants. Mean age of menarche was 12.7 ± 1.2 years. The average BMI of the participants was 21.6 ± 3.2 Kg/m² and 8% being overweight to obese. Study participants in urban settings had a higher proportion of underweight adolescents (14%), compared to those in rural settings (8%). 26% of the study participants reported a recent weight gain in the past 3 months. 22% of the study participants were involved in vigorous physical activity. Average waist-hip ratio of rural participants

(0.85 ± 0.02) was significantly higher in comparison to urban participants (0.83 ± 0.04) ($p=0.045$). 48% of the study participants in the urban settings reported a recent weight gain in the past three months, which was significantly higher compared to those in rural settings (4%) ($p<0.0001$). (table 1)

MENSTRUAL DISORDERS AND TOTAL HIRSUTISM SCORE OF THE PATIENTS:

Oligomenorrhea (26%) and irregular menses with weight gain (21%) were the common menstrual disorders. Urban participants (38%) had higher proportion of individuals with oligomenorrhea in comparison with rural participants (14%). Complaints of leucorrhoea (22%; $p<0.001$) and weight gain with irregular menses (40%; $p<0.001$) were also reported to be higher in frequency among urban participants. (table 2) 47% patients with excess androgen production (hirsutism score of 9 and above). 28% urban patients had higher hirsutism score which was significantly higher as compared to rural patients (38%). 37% patients were having excess androgen activity. The urban study participants had a higher frequency of excess androgen activity (58%; $p=0.028$). (table 2)

RESULTS:

Table 1. Demographic Characteristics of the Participants:

Variables		Rural	Urban	Total	P value
Age (Years)		16.4 ± 1.8	16.2 ± 2.2	16.1 ± 1.9	0.48
BMI	Mean BMI	20.6 ± 2.7	22.4 ± 3.8	21.6 ± 3.2	0.33
	Underweight (<18.5)	4 (8%)	7 (14%)	11 (11%)	0.25
	Norma (18.5–24.9)	44 (88%)	37 (74%)	81 (81%)	
	Overweight (25.0–29.9)	2 (4%)	4 (8%)	6 (6%)	
	Obese (30–34.9)	0 (0%)	2 (4%)	2 (2%)	
Waist Hip Ratio	0.84 ± 0.02	0.83 ± 0.04	0.84 ± 0.03		0.045
Weight gain during past 3 months	2 (4%)	24 (48%)	26 (26%)		<0.001
Vigorous Physical Activity	18 (36%)	4 (8%)	22 (22%)		<0.001

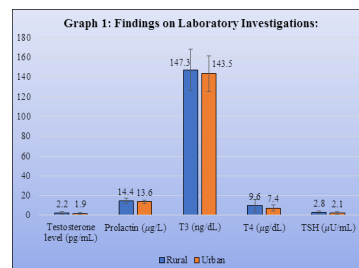
Table 2. Menstrual disorders and Total hirsutism score of the patients:

Variables		Rural	Urban	Total	P value
Menstrual disorders	Oligomenorrhea	7 (14%)	19 (38%)	26 (26%)	<0.001
	Secondary amenorrhea	4 (8%)	13 (26%)	17 (17%)	<0.001
	Complain of leucorrhoea	3 (4%)	11 (22%)	14 (14%)	<0.001
	Irregular menses with weight gain	1 (2%)	20 (40%)	21 (21%)	<0.001
	Total hirsutism score				0.032
Total hirsutism score	≤ 8 (normal)	31 (62%)	22 (44%)	53 (53%)	0.028
	9–15 (mild)	17 (34%)	18 (36%)	35 (35%)	
	>15 (moderate to severe)	2 (4%)	10 (20%)	12 (12%)	
Excess androgen activity	18 (36%)	29 (58%)	37 (37%)		
Total	17 (17%)	83 (83%)	100 (100%)		

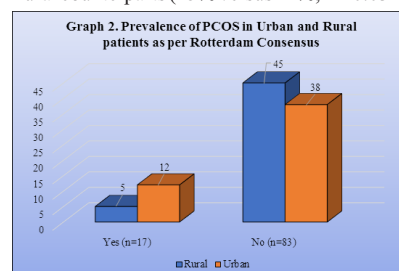
USG Findings and Laboratory Investigations:

63% of the study participants had a positive radiology test reflecting presence of polycystic ovaries. Hundred percent of the participants have not sought any kind of treatment for polycystic ovaries. Positive ultrasonographic results for polycystic ovaries have shown statistically significant association with location of the participants.

Average testosterone level of the participants was 2.1 ± 1.3 pg/mL. Participants average serum prolactin level was 14.1 ± 2.2 g/liter. Average values of T3, T4, and TSH were 146.6 ± 19.1 ng/dL, 8.3 ± 4.8 g/dL and 2.5 ± 1.3 U/mL, respectively. There was no statistically significant difference for serum testosterone level, Prolactin, T3, T4 or TSH of the urban and rural participants. (graph 1)



The proportion of urban participants diagnosed with PCOS was higher than their rural counterparts (25% versus 11%; $=0.031$) (Graph 2).



Association of Characteristics of Study Population with Rotterdam Consensus (Presence of all three Elements) on Women Health Aspect of PCOS for Adolescents Suggestions:

Analysis was performed to see any statistically significant association between the independent variables of the study participants with guidelines of Rotterdam Consensus for diagnosing PCOS. 17% of the participants were confirmed of having PCOS by recent guidelines of Rotterdam Consensus for adolescent diagnosis of PCOS (presence of all three elements). Majority of the individuals with PCOS had an average age of 14.8 ± 2.2 years ($p=0.04$) years. (table 3)

Table 3. Association between demographic variables with Rotterdam Consensus of PCOS:

Variables		Rotterdam Consensus		Total	P value
		Yes	No		
Age (Years)		14.8 ± 2.2	17.6 ± 1.9	16.1 ± 1.9	0.04
BMI	Mean BMI	21.9 ± 1.8	21.2 ± 3.3	21.6 ± 3.2	0.75
	Underweight	1 (5.9%)	10 (12%)	11 (11%)	0.79
	Norma	15 (88.2%)	66 (79.5%)	81 (81%)	
	Overweight	1 (5.9%)	5 (6.0%)	6 (6%)	
	Obese	0 (0%)	2 (2.4%)	2 (2%)	
Waist Hip Ratio	0.83 ± 0.02	0.86 ± 0.03	0.84 ± 0.03		0.33
Weight gain during past 3 months	9 (52.9%)	17 (20.5%)	26 (26%)		0.005
Vigorous Physical Activity	1 (5.9%)	21 (25.3%)	22 (22%)		0.08
Total	17 (17%)	83 (83%)	100 (100%)		

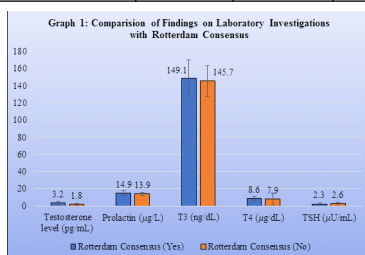
Results showed statistically significant association of Rotterdam Consensus (all three elements present) and weight gain in past three months ($p=0.005$) (table 3).

Participants Rotterdam Consensus had higher proportion of individuals with oligomenorrhea (47.1%) as well as higher hirsutism score (>8) in 55.4% participants but none of the association was significant (table 4).

There was statistically significant association of Rotterdam Consensus (all three elements present) and occurrence of PCOS on USG and higher Testosterone level (both p values <0.001) (graph 3). There was no statistically significant difference for serum testosterone level, Prolactin, T3, T4 or TSH of the urban and rural participants. (graph 3)

Table 4. Association between Menstrual disorders and Total Hirsutism score with Rotterdam Consensus of PCOS:

Variables		Rotterdam Consensus		Total	P value
		Yes	No		
Menstrual disorders	Oligomenorrhea or amenorrhea	8(47.1%)	35(42.2%)	43 (43%)	0.71
	Complain of leucorrhoea	2(11.8%)	12(14.5%)	14 (14%)	0.77
Total hirsutism score	≤8 (normal)	7(41.2%)	46(55.4%)	53 (53%)	0.21
	> 8 (high)	10(55.8%)	37(44.6%)	47 (35%)	
Total		17 (17%)	83 (83%)	100 (100%)	



DISCUSSION:

The teenage years bring tons of changes for girls. They go through physiological, anatomical, & psychological shifts. Because of family rules, traditions, and society's norms, many girls can't talk about or get good advice on period problems. One major issue is PCOS, which stands for polycystic ovarian syndrome. It's a big deal. We did a study to see the difference in how common PCOS is in urban vs. rural areas of India⁽⁶⁾.

Results of the study have shown that 17% of participants were diagnosed with PCOS. Proportion of PCOS was higher in urban population in comparison to rural counterparts. Previous study by F. R. Tehrani et al have reported a prevalence of PCOS ranging from 2.2 to 26%⁽⁷⁾.

For example, R. Nidhi and others found that 9.1% of girls aged 15-18 had PCOS in Anantapur, Andhra Pradesh⁽⁸⁾. Their average BMI was much like past studies'. Studies from Italy, Iran, & Japan showed 4.3%, 14.6%, and 26.2% rates of PCOS (respectively)^(9,10).

So, there was a study done by G. Rastrelli and colleagues in an urban Iranian setting. They studied 929 participants, and they found that only 22% of people had excess androgen activity. In our group, this percentage is higher—it reaches up to 37%. Anyway, there's another older study worth mentioning⁽¹¹⁾.

It showed that 52.4% of the folks involved had polycystic ovaries and also mentioned that 45.5% of them experienced oligomenorrhea (which is just a fancy term for infrequent periods). Comparing this to our own findings: we had 63% with polycystic ovaries and only 26% with oligomenorrhea. A strong point of our study is that it covers a wide age range—adolescents aged between 12 & 19 years.

CONCLUSION:

The proportion of participants diagnosed with PCOS was higher among urban participants in comparison to rural participants. The weight gain, excess androgen activity was higher among urban participants in comparison to rural participants.

It's a great concern to see how much common PCOS is and its related manifestations are in adolescents from urban area. Further studies should be conducted to understand what risks urban adolescents are exposed to & figure out what keeps rural adolescents safer. That way, we can find ways to help out and keep everyone safe.

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