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A COMMUNITY BASED STUDY, TO ESTIMATE PREVALENCE OF POLYCYSTIC OVARIAN SYNDROME AND ITS CLINICAL SIGNIFICANCE, IN REPRODUCTIVE AGE WOMEN IN TELANGANA, SOUTH INDIA.

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Abstract

Introduction: Polycystic Ovary Syndrome (PCOS) is a hormonal disorder that often leads to irregular menstrual cycles, excessive hair growth on the face or body (hirsutism), and the presence of multiple cysts in the ovaries. Globally, its prevalence varies widely—from 2.2% to 26%—due in part to inconsistencies in diagnostic criteria. This community-based study aims to determine the accurate prevalence of PCOS among women of reproductive age (15–45 years) and to explore the associated health effects.

Materials and Methods: A cross-sectional study was conducted involving 500 women aged 15–45 years from a rural community. Data were collected through structured interviews and clinical examinations. Among these participants, 182 women who exhibited clinical signs suggestive of PCOS underwent further biochemical tests and pelvic ultrasound to confirm the diagnosis. The study also assessed the health effects associated with PCOS. Data analysis was performed using SPSS version 20.

Results: The prevalence of PCOS in the study population was found to be 14% (42 out of 300). Among the diagnosed cases, infertility was the most frequently reported complication, followed by psychosocial issues.

Conclusion: Although 76.1% of women diagnosed with PCOS reported experiencing infertility, only 23.8% had received any form of treatment, highlighting a significant gap in diagnosis and access to care in the community.

Key words: Polycystic Ovarian Syndrome, Prevalence, Reproductive women, Clinical effects
Introduction:

Introduction

Polycystic Ovary Syndrome (PCOS) is one of the leading causes of infertility among women of reproductive age. Women affected by PCOS may take longer to conceive compared to those without

the condition, may have fewer children than planned, and face a higher risk of miscarriage. Among patients attending gynecology outpatient departments, PCOS is a frequently observed issue contributing to reproductive challenges.

The syndrome is primarily characterized by irregular menstrual cycles, excessive facial or body hair (hirsutism), and the presence of polycystic ovaries. The term "polycystic" refers to the appearance of multiple small, fluid-filled sacs (cysts) within the ovaries, which often contain immature eggs. PCOS is also associated with elevated levels of male hormones, known as androgens, which contribute to symptoms such as acne, hair thinning or male-pattern baldness, and difficulty with ovulation.

PCOS is a genetically influenced endocrine disorder with a complex and not fully understood cause. One of the central features of PCOS is hormonal imbalance, particularly the overproduction of androgens by the ovaries, which disrupts the normal ovulation process. This hormonal disturbance also contributes to other metabolic and physical symptoms, including weight gain, acne, and excessive hair growth [1].

Three major organizations have proposed diagnostic criteria for PCOS:

1. The National Institutes of Health/National Institute of Child Health and Human Development (NIH/NICHD) [2],
2. The European Society for Human Reproduction and Embryology and the American Society for Reproductive Medicine (ESHRE/ASRM), also known as the Rotterdam Criteria[3]
3. The Androgen Excess and PCOS Society [4].

Among these, the Rotterdam Criteria are the most widely used in both research and clinical practice. Globally, the reported prevalence of PCOS varies significantly—from 2.2% to 26%—due to differences in diagnostic definitions and methodologies. Variability in the clinical and endocrine criteria used to diagnose PCOS can greatly influence prevalence estimates, making it challenging to gauge the true scale of the problem [5].

Early diagnosis is essential because women with PCOS face an increased risk of developing insulin resistance, type 2 diabetes, high cholesterol, and hypertension [1]. Therefore, the management of PCOS should go beyond reproductive concerns and include screening for associated metabolic and cardiovascular risks to ensure comprehensive care and improved long-term outcomes.

Most previous studies in India have either focused on adolescent populations or hospital-based samples, often missing the broader picture. This study is community-based and includes the entire reproductive age group (15–45 years), aiming to accurately assess the prevalence of PCOS and to explore the associated clinical effects in women.

Material and Methods:

Study Design and Population

This was a community-based cross-sectional analytical study conducted among women of reproductive age (15–45 years) in a rural area from January 2022 to December 2024. The total population of women in this age group in the study area was 4132.

Inclusion Criteria: Women aged 15–45 years, with or without a prior PCOS diagnosis, who provided informed consent.

Exclusion Criteria: Women within two years of menarche, postmenopausal women, pregnant or lactating women, users of oral contraceptives or intrauterine devices, those diagnosed with cancer, or those who had undergone hysterectomy or bilateral oophorectomy.

Sample Size
The sample size was calculated using the formula for finite population correction:

$$Sample\ size(n) = \frac{\frac{z^2 X\ p(1-p)}{e^2}}{1 + \frac{z^2 X\ p(1-p)}{e^2 N}}$$

Where:
Z = 1.96 (95% confidence interval)
p = 9.13% (based on National Health Portal prevalence in South India) [1]
e = 5% (absolute precision)
N = 4132 (population size)

The calculated sample size was approximately 250, which was adjusted to 300 to account for a 20% non-response rate.

Sampling Method
Participants were selected using simple random sampling.

Data Collection
After obtaining ethical clearance from the Institutional Ethics Committee and informed consent from participants, data were collected through:
- Face-to-face interviews using a semi-structured questionnaire
- Clinical examinations
- Biochemical and hormonal tests (using Sensa Core ST 200 Pro/Plus/CL and Beckmann Access 2 analyzers)
- Ultrasound scans (transvaginal or transabdominal using Philips Affiniti, 5–7.5 MHz probe)

Procedure
Step 1: Community Survey
A door-to-door survey gathered socio-demographic data, menstrual and medical histories, and symptoms related to PCOS. Hirsutism was assessed using the Modified Ferriman-Gallwey (mFG) scoring method, where a score ≥8 indicated hirsutism [6]. Trained interviewers measured height, weight, BMI (kg/m²), and waist circumference (measured at the midpoint between the lower rib and iliac crest with a tensioned tape) [7].

Step 2: Diagnostic Evaluation
Women showing symptoms suggestive of PCOS (irregular menstruation and moderate to severe hirsutism), underwent further evaluation (after excluding 24 ineligible and 12 dropouts). Testing occurred on day 2 or 3 of the menstrual cycle. Fasting venous sample of about 10 ml was collected on day 2 or 3 of menstrual cycle.

Investigations included:
Basic tests: Blood sugar and lipid profile
Hormonal panel:
- FSH (5–20 mIU/ml)
- LH (5–20 mIU/ml)
- Prolactin (<25 ng/ml)
- TSH (0.5–5.0 mIU/L)
- Total Testosterone (6–86 ng/dl)
- Free Testosterone (0.7–3.6 pg/ml)
- Androstenedione (0.7–3.1 ng/ml)

- 17-OH Progesterone
- DHEAS
- SHBG (<41 nmol/L)

Ultrasound based on criteria by Rotterdam: ≥15 follicles (2–10 mm diameter) or
Ovarian volume ≥10 ml in at least one ovary. Other conditions (e.g., congenital adrenal hyperplasia, androgen-secreting tumors, Cushing syndrome, thyroid dysfunction, hyperprolactinemia) were ruled out.

Operational Definitions
PCOS Diagnosis (Rotterdam Criteria, 2003): Requires 2 out of 3:
1. Oligo/anovulation (cycle ≥35 days or amenorrhea)
2. Hyperandrogenism (clinical: acne, alopecia, mFG score ≥8; biochemical: elevated free testosterone or free androgen index)
3. Polycystic ovaries on ultrasound

PCOS Phenotypes:
- Frank/Classic: Anovulation + hyperandrogenism + PCO
- Classic Non-Cystic: Anovulation + hyperandrogenism
- Non-Classic Ovulatory: Hyperandrogenism + PCO
- Non-Classic Normoandrogenic: Anovulation + PCO

Hirsutism severity score was done based on ferriman gallwey scoring method. The modified Ferriman-Gallwey (mFG) score grades 9 body areas from 0 (no hair) to 4 (frankly virile), including the upper lip, chin, chest, upper abdomen, lower abdomen, thighs, back, arm, and buttocks. A total score of 8 or more is diagnostic for hirsutism [6].

Metabolic Syndrome (International Harmonization Definition): Any 3 of the following:
- Waist circumference ≥80 cm
- Triglycerides ≥1.7 mmol/L
- HDL <1.3 mmol/L
- Blood pressure ≥130/85 mmHg
- Fasting blood sugar >100 mg/dL

Data Analysis
Data was entered in Microsoft Excel and analyzed using SPSS version 22. Descriptive statistics included means and proportions. Chi-square and t-tests were used to assess associations, with a p-value < 0.05 considered statistically significant.

Results: Patient details and clinical examination findings were analyzed for all 300 study participants. Among them, 182 women who showed clinical signs suggestive of PCOS, who underwent further biochemical and ultrasound evaluations.

Using the revised Rotterdam criteria, PCOS was diagnosed and categorized into various phenotypes. The overall prevalence of PCOS in the study population was 42 women (14%). Of these, the majority—28 women (66.7%)—had the Frank or Classic PCOS phenotype, fulfilling all three diagnostic criteria (oligo/anovulation, hyperandrogenism, and polycystic ovaries). The remaining cases were distributed among other phenotypes as follows: Classic Non-Cystic PCOS: 4 women (9.5%), Non-Classic Ovulatory PCOS: 6 women (16.6%), Non-Classic Mild or Normo-Androgenic PCOS: 4 women (9.5%). (data presented in Table 1)

Table 1: Phenotypes of polycystic ovary syndrome as per the Rotterdam criteria

Phenotype	Rotterdam criteria	Frequency n= 42(100%)
Frank or classic polycystic (All the three criteria)	chronic anovulation, polycystic ovaries and hyperandrogenism	28 (66.7%)
Classic non Cystic	Anovulation, hyperandrogenism with normal ovaries	4(9.5%)
Non-classic ovulatory	Regular menses, polycystic ovaries and hyperandrogenism	6(16.6%)
Non-classic mild or normo-androgenic	Anovulation, polycystic ovaries with normal androgens	4(9.5%)

Mean age of the study participants were 25.3±5.3, patients belonging to age group 15-25 years and 26-35 years were 47% and 48.3%, with only 4.7% in the age group 36-45 years. Almost 52% women belong to upper middle class followed by middle class (32%) according to BG Prasads classification of Socio-economic status. Married women were 75% and having children were 54% (shown in table 2).

Table 2 Distribution of women based on socio demographic data Verses PCOS (n=624)

Sociodemographic variables		PCOS (42/14%)	No PCOS (258/86%)	Total (300/100%)	X^2 or t test / p value
Age	15-25 years	18(4.3%)	123(47.7%)	141(47%)	X^2 = 2.6/ p -0.2
	26-35 years	20(4.8%)	125(48.5%)	145(48.3%)	
	36-45 years	4(9.5%)	10(3.9%)	14(4.7%)	
Mean Age± SD		29.9±4.6	21.3±6.3	27.3±5.3	T=8.48/ P <0.0001
Socio Economic status (As per BG prasads classification)	Upper class	5(11.9%)	31(12%)	36(12%)	X^2 = 0.57. / p -0.9 Note: excluding lower class as it is 0.
	Upper middle class	21(50%)	135(52.3%)	156(52%)	
	Middle class	15(35.7%)	81(31.4%)	96(32%)	
	Lower Middle class	1(0.2%)	11(4.3%)	12(4%)	
	Lower class	0(0%)	0(0%)	0(0%)	
Marital status	Married	32(9%)	193(65.2%)	225(75%)	X^2 = 0.03. / p -0.85
	Unmarried	10(2.6%)	65(23.2%)	75(25%)	

Mean age of women with PCOS (29.9years) was slightly higher than women without PCOS(21.3) which was statistically significant. Oligomenorrhoea and family history suggestive of PCOS was seen in 85.7% and 35.7% of women with PCOS, which was significantly high when compared to women without PCOS (it was 15.1% and 17.4% respectively). Only 18% of women with PCOS had infertility treatment which was high compared with women without PCOS(3.4%). Proportion of clinical hyperandrogenism is more in women with PCOS(70.8%) than without PCOS (20.5%) and it was statistically significant. BMI > 23 and Blood pressure ≥ 130/85 were seen in more proportion of women with PCOS than without PCOS and was significant statistically (shown in table 3).

Table 3: Distribution based on history and anthropometric measurements Versus PCOS (n=300)

Variables	Subcategory	PCOS present (42)	PCOS absent (258)	Total (300)	X^2 or t test / p value
Mean age at which menarche attained		13.5±1.7 years	12.2±2.1years	13.6±2.4 years	t test = 4.6529 p value < 0.0001#
Oligomenorrhoea	Present	36(85.7%)	39(15.1%)	75(25%)	X2= 96/p -value is < .00001*
	Absent	6(14.3%)	219(84.9%)	225(75%)	
Family history of either	Present	15(35.7%)	45(17.4%)	60(20%)	X2= 7.5/p -value

hyperandrogenism or PCOS	Absent	27(64.3%)	213(82.56%)	240(80%)	is < .006*
Received infertility treatment in the past	Yes	10(23.8%)	14(5.4%)	24(8%)	X2= 16.6/ p - value = 0.00024*
	No	24(57.1%)	177(768.6%)	201(67%)	
	Not applicable	8(19%)	67(26%)	75(25%)	
Clinical hyperandrogenism {Hirsutism(mFGSscore > 8), acne, alopecia}	Present	31(73.8%)	53(20.5%)	84(28%)	X^2 – 50/p -value is < 0.00001*
	Absent	11(26.2%)	205(79.5%)	216(72.4%)	
BMI	Normal and underweight	15(35.7%)	215(83.3%)	230(76.7%)	X2- 45.7/p -value is < 0.00001*
	Overweight and obese	27(64.3%)	43(16.7%)	70(24%)	
Blood pressure ≥ 130/85	Present	18(42.8%)	44(17.05%)	62(20.6%)	X^2 – 14.7/ p - value is .00012*
	Absent	24(57.2%)	214(82.05%)	238(79.3%)	

Chisquare test (X2 test)= denoted as * and t test denoted as #

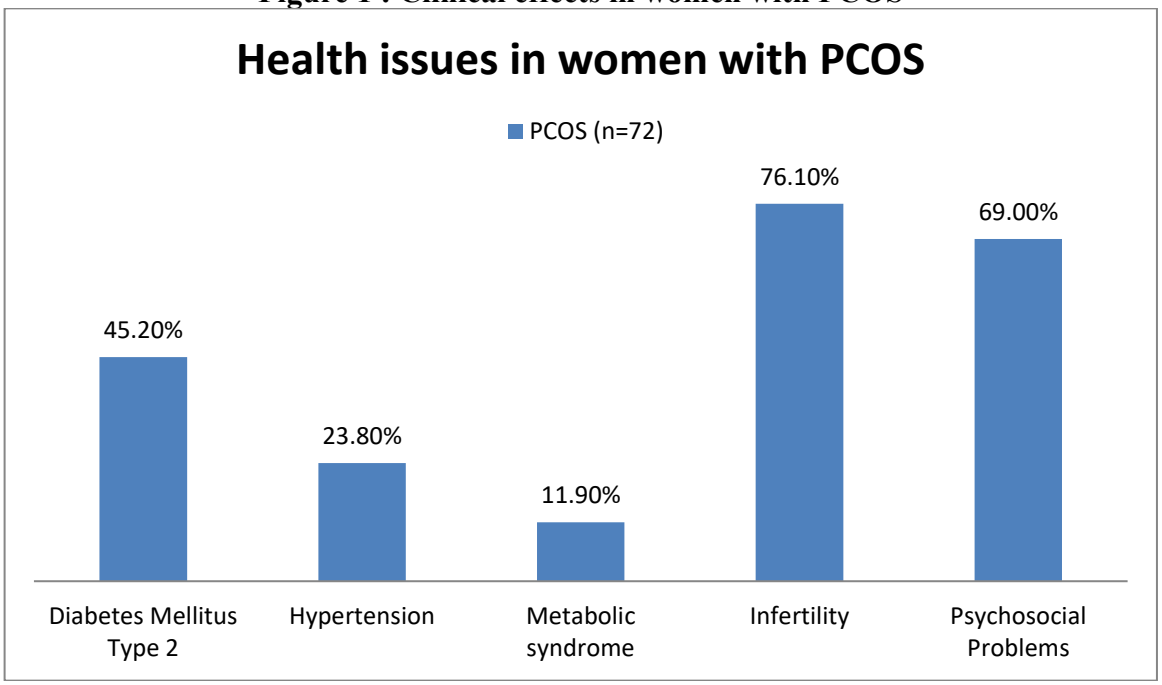
Hyperglycemia, identified through fasting glucose or 2-hour OGTT, was present in 76.2% of women with PCOS—significantly higher compared to those without the condition. Dyslipidemia was also more prevalent, affecting 64.3% of PCOS participants. Additionally, biochemical hyperandrogenism was observed in 90.4%, and polycystic ovarian morphology on ultrasound was seen in 80.9% of women with PCOS.
(Refer to Table 4 for detailed data.)

Table 4: Distribution based on Biochemical investigations and Ultrasound examination in patients suggestive of PCOS (n=152)

Variables	Subcategory	PCOS Present (42)	PCOS absent (110)	Total (n=152)	X^2 / p value
Hyperglycaemia in Fasting or 2hour glucose from OGTT	Present	32(76.2%)	12(10.9%)	44(28.9%)	62.97/<0.0001
	Absent	10(23.8%)	98(98.1%)	108(71.1%)	
Dyslipidaemia (serum triglyceride ≥1.7 mmol/L or serum high-density lipoprotein cholesterol <1.3 mmol/L,)	Present	27(64.3%)	29(26.4%)	56(36.8%)	18.8/0.000015
	Absent	15(25.7%)	81(73.6%)	96(69.2%)	
Biochemical hyperandrogenism	Present	38(90.4%)	14(12.7%)	52(34.2%)	81.634/ <0.00001
	Absent	4(9.6%)	96(87.3%)	100(65.8%)	
Polycystic ovaries on ultrasound	Present	34(80.9%)	23(20.9%)	57(37.5%)	46.75/ <0.00001
	Absent	8(19.1%)	87(79.1%)	95(62.5%)	

Among the 42 women diagnosed with PCOS, the most prevalent health issue was infertility, affecting 76.1% (32 out of 42). Psychosocial problems were reported in 69% (29 out of 42) women, with common concerns including anxiety and depression linked to infertility, hirsutism, alopecia, acne, negative body image, and other comorbid conditions. In terms of metabolic complications, Type 2 Diabetes Mellitus was observed in 19 women (45.2%, hypertension in 10 women 23.8%, and metabolic syndrome in 5 women 11.9% of the women with PCOS. (Refer to Figure 1 for detailed representation.)

Figure 1 : Clinical effects in women with PCOS



Discussion

The prevalence of PCOS in this community-based study among women aged 15–45 years was 14%, which is higher than findings by Vidya Bharati et al. (6% in women aged 18–24) and Nidhi et al. (9.13% in college students aged 15–18). However, it was lower compared to studies by Balaji et al. and Joshi et al., which reported prevalence rates of 18% and 22.5% in adolescents and young women aged 12–24, respectively. These discrepancies likely stem from differences in study populations and age ranges, making direct comparisons challenging and highlighting the variability in reported prevalence across different cohorts.

In our study, the Frank or Classic PCOS phenotype, characterized by the presence of all three Rotterdam criteria, was the most common, seen in 66.7% of cases. Other phenotypes included Classic Non-Cystic (9.5%), Non-Classic Ovulatory (16.6%), and Non-Classic Mild/Normo-Androgenic (9.5%). This distribution aligns with findings by Sachdeva G et al., who reported similar phenotype trends.

The mean age at menarche among women with PCOS in this study was 13.6 years, slightly higher than that of women without PCOS, and comparable to Ganie et al.'s findings (13.1 years). Oligomenorrhea was reported by 85.7% of women with PCOS—significantly higher than in the general population (25%) and also higher than the 65% reported by Ramanand SJ et al.

A positive family history suggestive of PCOS was present in 35.7% of participants, similar to findings by Tehrani FR et al. However, only 23.8% of affected women had received infertility treatment, reflecting results by Lauritsen et al. (19.1%). This gap in treatment highlights barriers such as underdiagnosis, limited access to healthcare, financial constraints, and dissatisfaction with available options.

Clinical hyperandrogenism was found in 73.8% of PCOS women, which is higher than the 51.7% reported by Ramanand et al. Biochemical hyperandrogenism was seen in 90.4% of PCOS participants—higher than the 51.5% reported by Lauritsen et al.

Regarding body mass index (BMI), 64.3% of PCOS women were overweight or obese. This is somewhat lower than the combined prevalence (80%) in the study by Abid K et al. Elevated blood pressure (≥130/85 mmHg) was seen in 42.8%, higher than the 40% elevated risk reported by Lo JC et al., even after adjusting for BMI, age, and metabolic status.

Metabolic syndrome was diagnosed in 11.9% of women with PCOS, which is higher than Joshi et al. (1 out of 135) and Deswal et al. (6.01%). The higher prevalence in our study may be attributed to differences in population demographics and risk factor exposure.

Among comorbidities, infertility and psychosocial issues (including depression and anxiety) were reported by 76.1% and 69% of PCOS women, respectively. These figures are notably higher than those reported by Deswal et al. (18.1% for infertility, 61.7% for psychological issues), reinforcing the significant emotional and social burden of the condition. Unfortunately, despite its high prevalence, psychosocial health remains under-recognized and inadequately managed in clinical care.

Diabetes mellitus was seen in 45.2% of PCOS participants in this study, slightly higher than the 40.2% reported by Sachdeva G et al.

Strengths and Limitations

Strengths:

- This was a community-based study covering the entire reproductive age range (15–45 years), providing a more representative assessment of PCOS prevalence and associated health effects in southindian population.

Limitations:

- The study was limited to a region, which may not fully reflect urban or national patterns.
- Women with cancers were excluded, despite malignancies being a potential comorbidity of PCOS, due to diagnostic and treatment limitations at the study site.

Conclusion

The prevalence of PCOS among reproductive-aged women (15–45 years) in this community was 14%, with the Frank or Classic PCOS phenotype being the most common (66.7%), followed by Non-Classic Ovulatory (16.6%). Women with PCOS had a higher mean age at menarche, positive family history, and experienced significantly more infertility (76.1%), yet only 23.8% had received prior treatment. This highlights major gaps in awareness, diagnosis, and accessibility to care. Psychosocial problems (69%), though widespread, remain poorly addressed in clinical management.

Recommendations

- Develop screening tools suitable for community-level use to enable early identification and intervention.
- Integrate PCOS-related services—including hormonal, reproductive, and mental health care—into national health programs, considering the long-term complications associated with PCOS.
- Conduct further research to understand the natural course and management outcomes in diverse populations, including rural, urban, and underserved groups.

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