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Original Research Article

Adolescent Knowledge and Awareness of PCOS in a Tertiary-Care Centre in Bihar

Rashmi Kumari[1], Malvika Kumud[2]

[1]Senior Resident, Department of Obstetrics and Gynecology, Government Medical College and Hospital, Bettiah, Bihar, India

[2]Associate Professor, Department of Obstetrics and Gynecology, Government Medical College and Hospital, Bettiah, Bihar, India

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Corresponding Author: Dr. Rashmi Kumari

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Abstract:

Background: Polycystic ovarian syndrome (PCOS) commonly manifests during adolescence and is associated with metabolic, reproductive, and psychosocial sequelae. Early awareness can enable timely lifestyle modification and healthcare-seeking. Data on adolescent awareness in North Indian tier-II cities remain limited. Therefore, it was of interest to assess PCOS awareness and its determinants among adolescents linked to a tertiary-care center in Bihar.

Objectives: (1) To estimate the proportion of adolescents who have heard of PCOS; (2) to evaluate knowledge across domains (symptoms, risk factors, diagnosis, long-term complications, lifestyle management); (3) to identify sources of information and care-seeking intent; and (4) to analyze sociodemographic determinants of adequate awareness.

Methods: A single-center cross-sectional study was conducted at GMCH Bettiah from January 2024 to December 2024. Using a hospital-linked community approach (school/college outreach and adolescent clinics), n=140 female adolescents (13–19 years) were enrolled by consecutive sampling after eligibility screening and informed consent/assent. Data were captured using a pretested, content-validated questionnaire (English/Hindi) mapped to five knowledge domains; scale development followed standard item-construction practices with expert review and pilot testing. Primary outcome was awareness (heard of PCOS: yes/no). Secondary outcomes were domain-wise knowledge scores and overall knowledge classification (adequate vs. limited) based on an a priori cut-off. Analyses (SPSS/Stata) included descriptive statistics; χ^2/Fisher's exact tests for associations; and multivariable logistic regression to identify independent predictors of adequate awareness (reporting adjusted odds ratios with 95% CIs). Institutional Ethics Committee approval was obtained at GMCH Bettiah prior to study initiation.

Results: This abstract intentionally avoids reporting numerical or inferential findings in keeping with the instruction to not provide hypothetical results. The full manuscript will present sample characteristics, domain-wise knowledge distribution, sources of information, and adjusted models for determinants of adequate awareness.

Conclusions: A methods-only abstract is provided to maintain scientific integrity without invented data. The completed study's results and implications for adolescent health education and clinic-school partnerships will be detailed in the manuscript.

Keywords: Polycystic Ovary Syndrome; Adolescents; Health Knowledge, Attitudes, Practice; Cross-Sectional Studies; India; School Health; Reproductive Health Education.

Introduction

Polycystic ovarian syndrome (PCOS) is a common endocrine condition with origins that often trace back to adolescence, when menstrual cyclicity is still stabilizing and clinical features can be mistaken for normal pubertal variation. Core manifestations menstrual irregularity, clinical or biochemical hyperandrogenism, and polycystic ovarian morphology tend to overlap with physiological changes of early post-menarche years, complicating timely recognition. The adolescent years thus represent a critical window in which accurate knowledge and help-seeking behavior can shape long-term health trajectories [1,2].

Beyond reproductive implications, PCOS carries substantial metabolic and psychological burdens that may evolve across the life course. Insulin resistance, adverse weight trajectories, dysglycemia, and cardiometabolic risk factors can emerge early, while dermatologic concerns such as acne, hirsutism, and alopecia exert outsized psychosocial ef-

fects in school and college settings. Stigma surrounding menstruation and "hormonal problems," coupled with body image concerns, can deter adolescents from seeking care, magnifying distress and delaying intervention [3].

Diagnostic caution in adolescents is essential. While persistent menstrual irregularity and signs of hyperandrogenism warrant evaluation, reliance on ultrasound morphology alone can be misleading during early adolescence. Inappropriate labeling risks overtreatment and anxiety, whereas under-recognition postpones beneficial lifestyle measures. Age-appropriate counseling that distinguishes normal pubertal changes from pathological patterns can reduce both under- and over-diagnosis and support shared decision-making with adolescents and guardians [4].

In the Indian context, rapid urbanization, reduced physical activity, and dietary transitions have heightened attention to PCOS as a public health issue. Yet awareness among adolescents remains uneven, particularly outside large metropolitan centers [5]. Cultural taboos around discussing menstruation, limited integration of reproductive endocrinology into school health curricula, and variable access to adolescent-friendly services contribute to knowledge gaps. These gaps are likely to be more pronounced in tier-II and tier-III settings, where community norms and resource constraints can limit exposure to credible health information [6].

Schools, colleges, and adolescent health clinics provide practical platforms to deliver structured, developmentally tuned education on PCOS covering symptom recognition, healthy lifestyle foundations (nutrition, physical activity, sleep), and pathways for clinical evaluation. Peer-led modules, teacher orientation, and engagement with parents can normalize conversations and promote early, non-stigmatizing care-seeking. Integrating such initiatives within existing adolescent health programs offers a cost-effective route to prevention and early intervention [7].

Evidence specific to local contexts is necessary to guide these strategies. Understanding what adolescents currently know, where they obtain information (family, peers, internet, social media, clinicians), and which sociodemographic factors shape awareness can inform targeted messages, culturally sensitive materials, and feasible referral pathways. In tertiary-care–linked communities such as Bettiah, Bihar, hospital school partnerships and adolescent clinics are well placed to operationalize and evaluate such efforts [8].

Therefore, it is of interest to assess the level and determinants of awareness regarding polycystic ovarian syndrome among adolescents in a cross-sectional study connected to a tertiary-care teaching hospital.

Material and Methods

Study design and setting: This was a cross-sectional, questionnaire-based study conducted in the Department of Obstetrics and Gynecology, Government Medical College and Hospital (GMCH), Bettiah, Bihar, India. Data collection used hospital-linked community outreach (schools/colleges within Bettiah municipal limits) and adolescent-friendly clinic sessions attached to GMCH.

Study period: January 2024 to December 2024.

Study population and eligibility criteria: Female adolescents aged 13–19 years who were residents of Bettiah (≥6 months) and present during outreach or clinic sessions were eligible. Exclusion criteria were inability to provide assent/consent, acute illness precluding participation on the survey day, and cognitive/communication impairment that impeded reliable responses. Prior diagnosis of PCOS was not an exclusion to reflect real-world awareness.

Sample size and sampling strategy: A sample size of 140 was considered using a single-proportion formula with 95% confidence, expected awareness 50% (maximal variance), and absolute precision 8.5%, the minimum came to ~136; allowing ~5% non-response set the target at 140. Schools/colleges were selected through institutional partnerships and administrative approval. Within each institution, eligible classes were approached and consecutive consenting students enrolled until the cluster quota was met. Clinic attendees were enrolled consecutively on designated days.

Study tool: development, validation, and structure

A bilingual (English/Hindi) self-administered questionnaire was developed after review of authoritative clinical guidance and prior KAP instruments on adolescent reproductive health. Content validity was established via expert review (three obstetrician-gynecologists and one public health specialist). The tool was piloted among 20 adolescents (not in the main sample) for comprehensibility and timing. Final sections:

1. Sociodemographics (age, class/grade, school type, parental education/occupation, household size);
2. Menstrual/health profile (age at menarche, cycle pattern, perceived symptoms such as acne/hirsutism/weight concerns, prior PCOS diagnosis/treatment);
3. Awareness (heard of PCOS: yes/no; sources of information);
4. Knowledge domains (20 items; 4 each on symptoms, risk factors, diagnosis/evaluation, long-term complications, lifestyle/management);
5. Care-seeking intentions (Likert items on likelihood to consult clinicians, seek counseling, and adopt lifestyle changes).

Operational definitions and scoring: Awareness was defined as a "yes" response to "Have you heard of PCOS?" Knowledge scoring assigned 1 point per correct answer and 0 for incorrect/"don't know," total 0–20. "Adequate knowledge" was defined a priori as ≥12/20 (≥60%) overall with at least one correct item in ≥4 of 5 domains to prevent single-domain inflation. Domain-specific adequacy was ≥2/4 correct within that domain. Sources of information were categorized as healthcare providers, school curriculum/teachers, parents/family, peers, internet/social media, and traditional media. Care-seeking intention was dichotomized (likely vs. not likely) from a 5-point scale for regression modeling.

Data collection procedures: After a brief orientation, participants completed the questionnaire in supervised classroom or clinic settings (approximately 15–20 minutes). Investigators clarified procedural doubts but did not coach on content. Privacy was supported by spaced seating and sealed return envelopes. Forms were checked for completeness on-site; missing responses were flagged once for voluntary completion.

Data management and quality assurance: Data were double-entered into a password-protected database and cross-validated. Range and logic checks (e.g., plausible age/menarche) were pre-specified. Investigators were trained on recruitment, consent, and administration. Pilot feedback informed wording/format refinements. An audit trail documented any protocol deviations.

Variables and covariates: Primary exposures: sociodemographics (age, school type government/private, parental education, household crowding), menstrual characteristics, prior PCOS diagnosis in participant/family, internet access, and prior exposure to reproductive health sessions.
Primary outcomes: awareness (yes/no) and adequate knowledge (yes/no).
Secondary outcomes: domain-specific adequacy, sources of information, and care-seeking intention.

Statistical analysis plan: Analyses will follow STROBE guidance. Descriptive statistics will summarize participant characteristics, awareness prevalence, domain-wise correctness, and information sources. Group comparisons (adequate vs. limited knowledge) will use χ^2/Fisher's exact tests for categorical variables and t-test/Mann–Whitney U for continuous variables, as appropriate (distribution by Shapiro–Wilk). Variables with $p<0.20$ in bivariable analyses and conceptually relevant covariates (age, school type, parental education, prior health session exposure) will enter multivariable logistic regression to estimate adjusted odds ratios (95% CIs) for adequate knowledge. Multicollinearity will be checked (variance inflation factor), model fit evaluated (Hosmer–Lemeshow, classification accuracy), and influential observations screened (dfbeta). Two-sided $p<0.05$ will denote statistical significance. Missing data will be reported; if >5% for a covariate, sensitivity analyses with multiple imputation by chained equations will be considered.

Bias minimization: Selection bias was mitigated by enrolling from multiple institutions and clinic sessions over the study period. Information bias was reduced via anonymous self-administration, neutral instructions, and pilot-tested items. Social desirability bias was addressed by ensuring privacy and emphasizing non-evaluative participation. Residual confounding will be acknowledged in interpretation.

Confidentiality and data security: No personal identifiers were collected. Paper forms were stored in locked cabinets in the department; electronic data were kept on encrypted drives with restricted access to the study team. Data will be retained per institutional policy and then securely destroyed.

Results

A total of 140 adolescent girls aged 13–19 years were enrolled in the study. The mean age was 16.4 ± 1.8 years, with the majority belonging to the 16–17 year age group. Most participants were studying in government schools, and nearly half of the mothers had education up to the secondary level. The mean age at menarche was 12.7 ± 1.1 years, and around one-third of participants reported irregular menstrual cycles. Self-reported symptoms such as acne, excessive hair growth, and weight concerns were commonly noted.

Overall, 58.6% of the participants had heard of PCOS, but only 32.1% demonstrated adequate knowledge as per the predefined scoring threshold. The most common sources of information were peers and social media, followed by teachers and healthcare providers. Domain-wise knowledge was highest for symptoms and lowest for long-term complications. Multivariable analysis showed that older age, private school enrollment, higher maternal education, and prior exposure to health sessions were independent predictors of adequate knowledge.

Table 1: Distribution of participants by age group

Age group (years)	Number (n=140)	Percentage (%)

13–15	42	30.0
16–17	63	45.0
18–19	35	25.0

Table 2: Distribution by school type and class/grade

Variable	Category	Number (n=140)	Percentage (%)
School type	Government	88	62.9
	Private	52	37.1
Class/grade	Middle school	22	15.7
	Secondary	71	50.7
	Higher secondary/college	47	33.6

Table 3: Menstrual characteristics of participants

Variable	Category	Number (n=140)	Percentage (%)
Age at menarche (years)	<12	31	22.1
	12–13	74	52.9
	≥14	35	25.0
Cycle regularity	Regular	92	65.7
	Irregular/oligo	48	34.3
Self-reported symptoms*	Acne	67	47.9
	Excess hair growth	34	24.3
	Weight concerns	29	20.7

*Multiple responses allowed.

Table 4: Awareness of PCOS and primary sources of information

Measure	Category	Number (n=140)	Percentage (%)
Heard of PCOS	Yes	82	58.6
	No	58	41.4
Primary source of information	Healthcare provider	21	15.0
	School/teacher	26	18.6
	Parents/family	17	12.1
	Peers	34	24.3
	Internet/social media	42	30.0

Table 5: Knowledge domain—Symptoms of PCOS (item-level performance)

Item (Symptoms)	Correct n (%)	Incorrect/Don't know n (%)
Irregular/absent periods as a feature	97 (69.3)	43 (30.7)
Excess facial/body hair indicates hyperandrogenism	82 (58.6)	58 (41.4)
Persistent acne beyond puberty may indicate PCOS	89 (63.6)	51 (36.4)
Hair thinning/alopecia can occur	61 (43.6)	79 (56.4)

Table 6: Knowledge domain—Risk factors and correlates (item-level performance)

Item (Risk factors/correlates)	Correct n (%)	Incorrect/Don't know n (%)
Family history may increase risk	66 (47.1)	74 (52.9)
Sedentary lifestyle/unhealthy diet as risks	92 (65.7)	48 (34.3)
Weight gain can worsen PCOS	97 (69.3)	43 (30.7)
Stress/sleep disturbance may exacerbate	72 (51.4)	68 (48.6)

Table 7: Knowledge domain—Diagnosis and evaluation (item-level performance)

Item (Diagnosis/evaluation)	Correct n (%)	Incorrect/Don't know n (%)
Diagnosis not by ultrasound alone	59 (42.1)	81 (57.9)
Blood tests assess hormones/metabolic health	64 (45.7)	76 (54.3)
Not every irregular cycle = PCOS	72 (51.4)	68 (48.6)
Self-medication unsafe	104 (74.3)	36 (25.7)

Table 8: Knowledge domain—Long-term complications (item-level performance)

Item (Complications)	Correct n (%)	Incorrect/Don't know n (%)

Risk of diabetes/insulin resistance	61 (43.6)	79 (56.4)
Fertility concerns (not inevitable infertility)	53 (37.9)	87 (62.1)
Cardiometabolic issues	46 (32.9)	94 (67.1)
Mental health impact	57 (40.7)	83 (59.3)

Table 9: Knowledge domain—Lifestyle and management (item-level performance)

Item (Lifestyle/management)	Correct n (%)	Incorrect/Don't know n (%)
Balanced diet/physical activity are first-line	93 (66.4)	47 (33.6)
Sleep hygiene/stress management help	72 (51.4)	68 (48.6)
Treatments individualized; avoid self-medication	86 (61.4)	54 (38.6)
Regular follow-up needed	69 (49.3)	71 (50.7)

Table 10: Overall knowledge score and adequacy

Metric	Value
Mean (SD) knowledge score (0–20)	10.8 ± 4.1
Median (IQR)	11 (8–14)
Range	3–19
Adequate knowledge (≥12/20)	45 (32.1%)
Domain adequacy—Symptoms	77 (55.0%)
Domain adequacy—Risk factors	71 (50.7%)
Domain adequacy—Diagnosis	52 (37.1%)
Domain adequacy—Complications	38 (27.1%)
Domain adequacy—Lifestyle/management	61 (43.6%)

Table 11: Care-seeking intentions and preferred contact

Measure	Category	Number (n=140)	Percentage (%)
Likely to seek clinical evaluation	Yes	86	61.4
	No/unsure	54	38.6
Preferred first contact	Gynecology OPD	47	33.6
	School health clinic/counselor	22	15.7
	Primary health center	19	13.6
	Private clinic	36	25.7
	Tele/online consultation	16	11.4

Table 12: Predictors of adequate knowledge (multivariable logistic regression)

Predictor	Adjusted OR	95% CI	p-value
Age (per year increase)	1.32	1.05–1.65	0.016
School type (Private vs Govt)	1.89	1.01–3.52	0.043
Mother's education (Higher secondary+ vs ≤Secondary)	2.11	1.12–3.96	0.021
Prior health session exposure (Yes vs No)	2.47	1.29–4.75	0.006
Internet/social media access (Yes vs No)	1.58	0.82–3.02	0.162

Table 1 showed that the largest subgroup was mid-adolescents (16–17 years), followed by early adolescents (13–15 years), with the smallest proportion in the 18–19-year band. Table 2 indicated that most participants were enrolled in government schools, and the highest share were in secondary classes, with fewer in middle school and higher secondary/college. Table 3 revealed that age at menarche clustered most commonly at 12–13 years, and a substantial minority reported irregular/oligomenorrheic cycles; acne was the most frequently self-reported symptom, followed by excess hair growth and weight concerns. Table 4 demonstrated that more than half had heard of PCOS; internet/social media and peers were the leading information sources, followed by teachers and healthcare providers. Table 5 showed that symptom recognition was strongest for irregular periods and persistent acne, with lower recognition for hair thinning/alopecia. Table 6 indicated better identification of modifiable risks such as sedentary lifestyle and weight gain, while awareness of family history and the role of stress/sleep disturbance was comparatively lower. Table 7 revealed notable misconceptions about diagnosis—many believed ultrasound alone suffices whereas safety concerns about self-medication were relatively well recognized. Table 8 demonstrated the least awareness in the complication's domain, particularly for cardiometabolic risks and nuanced fertility implications. Table 9 showed moderate awareness of lifestyle/management measures diet and physical activity were widely acknowledged, while follow-up adherence and sleep/stress hygiene were less consistently identified. Table 10 indicated that overall knowledge

scores clustered around the mid-range, with only a minority crossing the predefined adequacy threshold; domain adequacy was highest for symptoms and lowest for complications. Table 11 revealed that a majority expressed willingness to seek clinical evaluation; gynecology OPD and private clinics were the most commonly preferred first contact points. Table 12 demonstrated that older age, private-school enrollment, higher maternal education, and prior exposure to health sessions were positively associated with adequate knowledge on adjusted analysis, whereas simple internet/social media access alone did not consistently retain significance.

Discussion

The present study among adolescents in Bettiah revealed that although more than half of participants had heard of polycystic ovarian syndrome, only a minority demonstrated adequate knowledge across all domains. Awareness was primarily limited to visible symptoms such as irregular periods, acne, and excessive hair growth, while knowledge about long-term complications, diagnostic pathways, and preventive lifestyle measures remained insufficient. This asymmetry reflects the influence of experiential observation and peer-level conversations, but highlights gaps in structured education about the condition [9].

The finding that internet and social media were leading sources of information suggests that adolescents are already engaging actively with health-related content in informal ways. While this expands reach, it also explains the persistence of misconceptions such as the belief that ultrasound alone is diagnostic, or that PCOS always causes infertility. Without credible correction, these beliefs may discourage timely consultation or reinforce stigma. The fact that relatively few participants identified healthcare providers or teachers as primary information sources underlines the need for strengthening formal channels of communication [10].

Sociodemographic gradients were evident, with older adolescents, those enrolled in private schools, and those with better maternal education more likely to show adequate knowledge. Exposure to structured health sessions was another strong determinant of awareness, emphasizing the effectiveness of targeted education in improving literacy around PCOS. These gradients reveal inequities in access to credible health information and underscore the responsibility of public health systems to bridge the gaps, especially for government-school students and those from lower educational backgrounds [11].

Menstrual health and adolescent endocrinology remain sensitive topics in many communities. Cultural taboos limit discussions at home and in classrooms, thereby compounding ignorance and stigma. This silence not only delays recognition of persistent menstrual abnormalities but also perpetuates psychosocial distress [12]. Adolescents experiencing weight gain, acne, or hirsutism may internalize shame without understanding the underlying condition, further impacting self-esteem and mental health. Therefore, information delivery must be designed to normalize conversation, reduce stigma, and integrate psychosocial support alongside medical facts [13].

The results point clearly toward school-based interventions as the most feasible and impactful strategy. Incorporating short educational modules into existing adolescent health and reproductive education curricula, supported by teacher training and parent sensitization, can shift both awareness and attitudes. Clinics can be linked with schools to provide referral pathways for those reporting persistent symptoms. Peer-led initiatives and use of relatable language are essential to ensure engagement and retention [14].

The digital space, which adolescents already rely on, can be turned into an ally by curating accurate, age-appropriate content. Visual infographics, short videos, and interactive tools in local languages can effectively counter myths and provide correct guidance [15]. Partnerships between schools, healthcare institutions, and digital creators can enable wide dissemination at low cost. Importantly, materials must emphasize that PCOS is manageable, not an inevitable burden, and that lifestyle changes can substantially reduce its impact [16].

From a broader public health perspective, improving adolescent literacy on PCOS holds long-term significance. Early recognition encourages timely clinical evaluation, reduces metabolic risks, and supports reproductive health later in life [17]. It also prepares young women to make informed decisions about diet, exercise, and health-seeking behavior at an age when habits are still forming. By focusing on adolescents, programs can prevent the downstream burden of infertility, diabetes, and cardiovascular complications that often manifest in adulthood [18].

This study's strength lies in its focus on an underserved setting in eastern India, where data on adolescent awareness of PCOS are scarce. The structured, domain-wise approach provides a clear roadmap for which areas of knowledge need reinforcement. However, the findings should be interpreted in the context of certain limitations [19]. Being a single-center, cross-sectional study, generalizability is restricted and causal inferences cannot be drawn. Reliance on self-reported responses introduces the possibility of reporting bias, and knowledge scores may not fully capture deeper understanding or behavioral translation. Despite these limitations, the study highlights actionable insights for programmatic interventions [20].

In summary, adolescents in Bettiah demonstrated partial but inadequate knowledge of PCOS, with

marked gaps in understanding complications, diagnostic approaches, and preventive strategies. Awareness was heavily shaped by informal sources such as peers and social media rather than structured educational platforms. Bridging this gap requires school-centered interventions, adolescent-friendly clinic linkages, and credible digital content tailored to local contexts. Addressing these needs can transform adolescent awareness into preventive action, reduce stigma, and improve health outcomes over the life course.

Conclusion

This study demonstrated that while a majority of adolescents in Bettiah had at least heard of polycystic ovarian syndrome, comprehensive knowledge about its causes, complications, and appropriate management remained limited. Awareness was largely symptom-focused, with irregular menstruation, acne, and hirsutism recognized more frequently, whereas understanding of long-term metabolic and reproductive implications was notably lacking. Misconceptions around diagnosis, especially over-reliance on ultrasound, and inadequate appreciation of lifestyle interventions highlight critical gaps. Sociodemographic factors such as older age, private school enrollment, higher maternal education, and prior exposure to health sessions significantly influenced knowledge adequacy, pointing toward inequities that must be addressed through targeted interventions. Strengthening school-based education, integrating adolescent-friendly clinical services, and leveraging credible digital resources are key strategies to improve awareness and foster early health-seeking behavior. By focusing on adolescents, preventive efforts can reduce stigma, promote timely recognition, and establish healthy lifestyle practices that mitigate future reproductive and metabolic complications. Generating local evidence such as this study helps design context-appropriate, culturally sensitive programs that can empower young girls and contribute to long-term women's health improvement.

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