

Association between Polycystic Ovarian Syndrome and Mental Health Disorders in Adolescent Girls

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Abstract

Background: Polycystic Ovarian Syndrome (PCOS) is one of the most common endocrine disorders in adolescent girls, manifesting with menstrual irregularities, acne, hirsutism, obesity, and metabolic dysfunction. Beyond reproductive and metabolic consequences, PCOS significantly affects psychological well-being. Depression, anxiety, and low self-esteem are frequently reported, but limited studies address this burden in adolescents. This study aimed to assess the association between PCOS and mental health disorders among adolescent girls.

Methodology: A cross-sectional observational study was conducted from January 2024 to January 2025 in a tertiary care teaching hospital. A total of 200 adolescent girls (100 PCOS cases diagnosed by revised Rotterdam criteria and 100 age-matched controls) were enrolled. Mental health was assessed using validated tools: PHQ-9 for depression, GAD-7 for anxiety, and Rosenberg Self-Esteem Scale for self-esteem. Data were analyzed using SPSS v25.0, with t-tests, Chi-square, and logistic regression applied; $p < 0.05$ was considered significant.

Results: The mean age was comparable between groups, but BMI was significantly higher in PCOS adolescents (26.1 ± 4.2 vs. 22.8 ± 3.6 ; $p < 0.001$). Menstrual irregularity, acne, and hirsutism were significantly more frequent in the PCOS group. Moderate-to-severe depression was present in 56% of PCOS cases versus 26% of controls ($p < 0.001$). Moderate-to-severe anxiety affected 48% of PCOS cases compared to 20% of controls ($p < 0.001$). Low self-esteem was observed in 42% of PCOS adolescents, significantly higher than 15% in controls ($p < 0.001$).

Conclusion: Adolescent girls with PCOS exhibit significantly higher rates of depression, anxiety, and low self-esteem compared to their peers.

Recommendations: Routine psychological screening should be integrated into PCOS management. Early counseling, psychosocial support, and multidisciplinary care are recommended to improve outcomes. Future multicentric studies are warranted to establish tailored mental health interventions for adolescents with PCOS.

Keywords: Polycystic Ovarian Syndrome, Adolescents, Depression, Anxiety, Self-Esteem, Mental Health.

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Introduction

Polycystic Ovarian Syndrome (PCOS) is a common endocrine disorder affecting women of reproductive age, with a prevalence ranging from 5–15% worldwide, depending on diagnostic criteria and population studied. Although often diagnosed in adulthood, PCOS frequently manifests during adolescence, making early detection and management crucial. The syndrome is characterized by chronic anovulation, hyperandrogenism, and polycystic ovarian morphology, but its clinical spectrum extends beyond reproductive health, impacting metabolic, psychological, and social dimensions of life. [1] Adolescence is a sensitive developmental phase characterized by rapid physical, emotional, and

social changes. The onset of PCOS during this period can be particularly distressing, as clinical features such as irregular menstruation, acne, hirsutism, obesity, and difficulty in weight control directly affect self-image and psychosocial well-being. These visible manifestations often lead to embarrassment, low self-esteem, and body image disturbances in teenage girls, increasing vulnerability to various mental health disorders. [2] Recent studies highlight that PCOS is not only a reproductive and metabolic condition but also strongly associated with mental health comorbidities. Depression, anxiety, eating disorders, and diminished quality of life are frequently reported among adolescent girls with

PCOS. The bidirectional relationship between hormonal imbalance and psychological disturbances further complicates the clinical course. For example, insulin resistance and hyperandrogenism may alter neurotransmitter regulation, contributing to mood instability, while psychosocial stressors may exacerbate hormonal imbalance through hypothalamic–pituitary–adrenal (HPA) axis dysregulation. [3]

Globally, depression is one of the leading causes of disability among adolescents, and its burden is particularly concerning in young females with PCOS. Cross-sectional studies suggest that adolescent girls with PCOS are twice as likely to experience depressive symptoms compared to their peers. Anxiety disorders are similarly prevalent, often linked to the unpredictability of menstrual cycles, cosmetic concerns due to hirsutism or acne, and fear of infertility in the future. These mental health challenges can hinder academic performance, social relationships, and overall quality of life. [4]

The cultural context also plays a significant role in shaping the psychological impact of PCOS. In societies where physical appearance and fertility are highly valued, adolescent girls with PCOS may experience stigma, discrimination, and social isolation. Such negative experiences amplify the risk of emotional distress.

Furthermore, the lack of awareness about PCOS in families, schools, and communities often results in delayed diagnosis and inadequate support, aggravating psychological burden. [5] From a biological perspective, the hormonal abnormalities of PCOS are linked to neurobiological pathways that regulate mood. Elevated testosterone and other androgens may contribute to aggression, irritability, and emotional dysregulation. Insulin resistance, a common feature of PCOS, is associated with low-grade systemic inflammation and altered serotonergic activity, both of which are implicated in the pathogenesis of depression and anxiety. Moreover, obesity, which frequently coexists with PCOS, independently contributes to poor self-image and increased risk of psychiatric morbidity. [6]

The adolescent phase also poses diagnostic challenges. Many features of PCOS, such as irregular menstruation and acne, overlap with normal pubertal changes, making it difficult to distinguish pathological from physiological processes. Consequently, mental health consequences may be overlooked in the rush to manage physical symptoms. This underlines the importance of adopting a holistic approach that integrates reproductive, metabolic, and psychological dimensions in adolescent PCOS care. [7] Despite growing recognition of the mental

health implications of PCOS, most research has focused on adult women, with relatively limited evidence specific to adolescents. Given the lifelong implications of PCOS and the critical nature of adolescent development, understanding the association between PCOS and mental health disorders in teenage girls is essential. Early recognition of psychiatric comorbidities not only improves quality of life but also enhances adherence to lifestyle modification and medical treatment. [8]

Therefore, this study was undertaken to explore the association between PCOS and mental health disorders in adolescent girls. By comparing psychological outcomes such as depression, anxiety, and self-esteem between girls with and without PCOS, this research aims to generate insights that can guide early screening, counseling, and integrated care strategies.

Materials and Methods

Study Design and Setting: This was a cross-sectional, observational study conducted in the Department of Obstetrics and Gynecology, in collaboration with the Department of Psychiatry, at World medical college Jhajjar a tertiary care teaching hospital.

The study was carried out over a period of 12 months (from January 2024 to Jan 2025). Ethical clearance was obtained from the Institutional Ethics Committee prior to commencement, and informed assent/consent was taken from all participants and their guardians.

Study Population: The study included adolescent girls aged 13–19 years who attended the outpatient gynecology clinic. Participants were divided into two groups:

- **Cases (PCOS group):** Adolescent girls diagnosed with PCOS according to the revised Rotterdam criteria (at least two of the following—oligo/anovulation, clinical/biochemical hyperandrogenism, and polycystic ovarian morphology on ultrasound).
- **Controls:** Age-matched adolescent girls without PCOS, selected from the same clinical setting.

Sample Size: Based on previous literature suggesting higher prevalence of depression and anxiety in PCOS (approximately 40%) compared to controls (20%), with 80% power and 5% significance, the required minimum sample size was calculated as 100 participants in each group (total 200).

Inclusion Criteria

- Female adolescents aged 13–19 years.

- Willingness to participate with parental/guardian consent.

Exclusion Criteria

- History of pre-existing psychiatric illness or current psychiatric treatment.
- Chronic medical disorders such as diabetes mellitus, thyroid disease, or congenital adrenal hyperplasia.
- Use of medications affecting mood or hormonal profile.

Data Collection Tools: All participants underwent detailed history taking and clinical examination. Mental health status was assessed using validated instruments:

- Patient Health Questionnaire-9 (PHQ-9) for depression.
- Generalized Anxiety Disorder-7 (GAD-7) scale for anxiety.
- Rosenberg Self-Esteem Scale (RSES) for self-esteem assessment.

Data Collection Procedure: All participants underwent a structured data collection process, which included both clinical assessment and psychological evaluation. After obtaining informed consent from parents/guardians and assent from the adolescents, a detailed demographic and clinical history was recorded. Information on age, educational status, socioeconomic background, menstrual history, body mass index (BMI), and presence of acne, hirsutism, and family history of PCOS was documented.

A thorough physical and systemic examination was performed, with particular attention to anthropometric measurements and signs of hyperandrogenism. Ultrasound examination was carried out in clinically indicated cases to support the diagnosis of PCOS as per the revised Rotterdam criteria. Following clinical assessment, all participants were subjected to a structured mental health evaluation using standardized, validated

tools. The Patient Health Questionnaire-9 (PHQ-9) was administered to assess depressive symptoms, with scores ranging from 0 to 27. Based on cut-off values, participants were categorized into minimal, mild, moderate, moderately severe, or severe depression. The Generalized Anxiety Disorder-7 (GAD-7) scale was used to measure anxiety symptoms, with a scoring range of 0 to 21, classifying anxiety severity as minimal, mild, moderate, or severe. For evaluation of self-esteem, the Rosenberg Self-Esteem Scale (RSES), a 10-item Likert-type scale, was applied, categorizing participants into low, normal, or high self-esteem.

The questionnaires were self-administered in a quiet and private setting to ensure confidentiality and minimize peer or parental influence. For participants with limited literacy, trained investigators read out the questions in the local language and explained them in simple terms without leading responses. All responses were cross-checked for completeness, and any missing or ambiguous answers were clarified immediately. Psychological scoring was performed according to standardized scoring guidelines for each instrument.

The collected data were then coded and entered into a secured database for further statistical analysis. To maintain objectivity, investigators conducting psychological assessments were blinded to the clinical grouping of participants (PCOS vs. controls). This procedure ensured accuracy, reliability, and consistency in data collection across all study subjects.

Statistical Analysis: Data were entered into Microsoft Excel and analyzed using SPSS version 25.0. Continuous variables were expressed as mean $\pm$ standard deviation (SD), and categorical variables as percentages. Independent t-test and Chi-square test were applied to compare groups. Logistic regression was performed to identify independent predictors of mental health disorders in PCOS. A p-value <0.05 was considered statistically significant.

Table 1: Baseline Characteristics of Participants

Variable	PCOS Group (n=100)	Control Group (n=100)	p-value
Age (years), mean $\pm$ SD	16.4 $\pm$ 1.8	16.2 $\pm$ 1.7	0.42
BMI (kg/m ²), mean $\pm$ SD	26.1 $\pm$ 4.2	22.8 $\pm$ 3.6	<0.001
Socioeconomic Status (Low, %)	42 (42.0)	39 (39.0)	0.67
Menstrual Irregularity (%)	85 (85.0)	22 (22.0)	<0.001
Acne (%)	68 (68.0)	21 (21.0)	<0.001
Hirsutism (%)	54 (54.0)	9 (9.0)	<0.001

The baseline characteristics indicate that the mean age of participants in both groups was comparable (16.4 $\pm$ 1.8 years in the PCOS group vs. 16.2 $\pm$ 1.7 years in controls, $p=0.42$), showing no significant age difference. However, the mean BMI was significantly higher among adolescents with PCOS

(26.1 $\pm$ 4.2 kg/m²) compared to controls (22.8 $\pm$ 3.6 kg/m², $p<0.001$), reflecting a greater prevalence of overweight/obesity in the PCOS group. Socioeconomic status distribution did not differ significantly between the groups ($p=0.67$). Clinically, menstrual irregularity was strikingly

more frequent in the PCOS group (85%) compared to controls (22%), while acne (68% vs. 21%) and hirsutism (54% vs. 9%) were also significantly more prevalent among PCOS participants (all $p < 0.001$). These findings confirm that adolescent

girls with PCOS exhibit classical clinical and metabolic features, including higher BMI, menstrual disturbances, and signs of hyperandrogenism, compared to their healthy peers.

Table 2: Distribution of Depression (PHQ-9 scores)

Depression Severity	PCOS Group (n=100)	Control Group (n=100)	p-value
Minimal (0-4)	18 (18.0)	46 (46.0)	<0.001
Mild (5-9)	26 (26.0)	28 (28.0)	-
Moderate (10-14)	28 (28.0)	18 (18.0)	-
Moderately Severe (15-19)	20 (20.0)	7 (7.0)	-
Severe (20-27)	8 (8.0)	1 (1.0)	-

The distribution of depression severity, as assessed by PHQ-9, revealed a significantly higher prevalence of depressive symptoms among adolescents with PCOS compared to controls. Minimal depression was more common in the control group (46%) than in the PCOS group (18%), indicating better psychological well-being among healthy adolescents. In contrast, moderate depression (28% vs. 18%), moderately severe

depression (20% vs. 7%), and severe depression (8% vs. 1%) were all markedly higher among the PCOS group. Mild depression was observed in nearly equal proportions in both groups (26% vs. 28%). The overall difference in depression distribution was statistically significant ($p < 0.001$), underscoring that adolescents with PCOS are at a greater risk of moderate-to-severe depressive symptoms compared to their peers without PCOS.

Table 3: Distribution of Anxiety (GAD-7 scores)

Anxiety Severity (GAD-7)	PCOS Group (n=100)	Control Group (n=100)	p-value
Minimal (0-4)	22 (22.0%)	48 (48.0%)	<0.001
Mild (5-9)	30 (30.0%)	32 (32.0%)	-
Moderate (10-14)	28 (28.0%)	15 (15.0%)	-
Severe (15-21)	20 (20.0%)	5 (5.0%)	-
Total	100 (100%)	100 (100%)	

The distribution of anxiety severity, measured by GAD-7, showed a clear difference between adolescents with PCOS and controls.

Minimal anxiety was significantly more common among controls (48%) than in the PCOS group (22%), reflecting better psychological status in healthy peers. In contrast, moderate (28% vs. 15%) and severe anxiety (20% vs. 5%) were considerably

more prevalent in the PCOS group, while mild anxiety occurred in nearly equal proportions in both groups (30% vs. 32%).

The overall difference was statistically significant ($p < 0.001$), highlighting that adolescents with PCOS are at a much higher risk of experiencing moderate-to-severe anxiety symptoms compared to those without PCOS.

Table 4: Self-Esteem Levels (Rosenberg Scale)

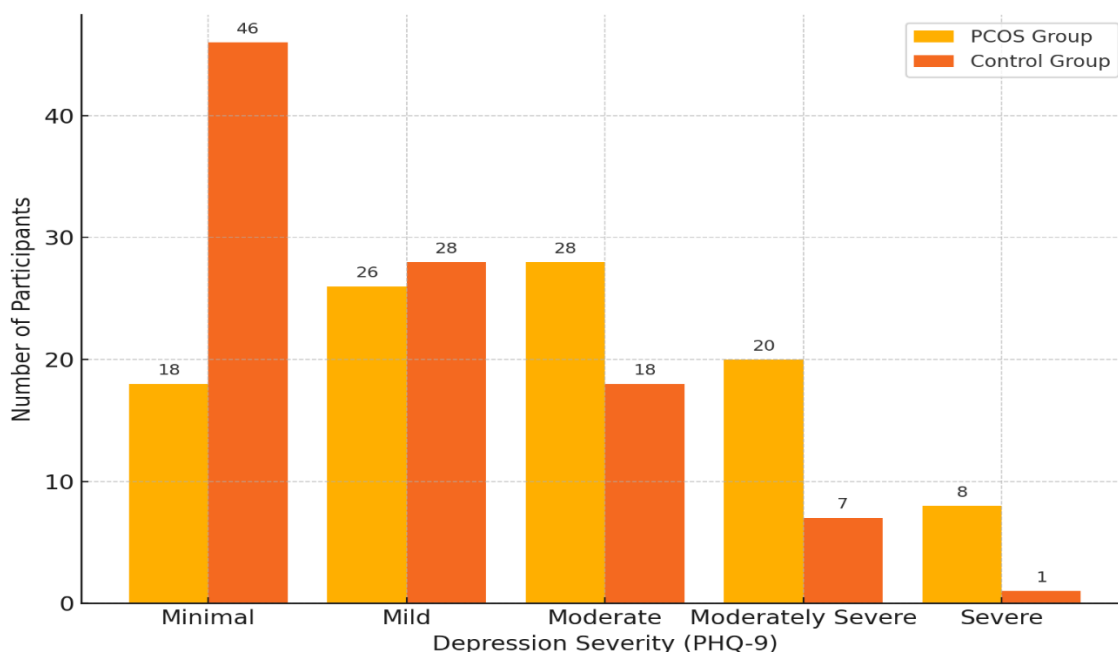
Self-Esteem Level	PCOS Group (n=100)	Control Group (n=100)	p-value
Low	42 (42.0)	15 (15.0)	<0.001
Normal	45 (45.0)	58 (58.0)	-
High	13 (13.0)	27 (27.0)	-

Assessment of self-esteem using the Rosenberg Self-Esteem Scale demonstrated significantly lower self-esteem among adolescents with PCOS compared to controls.

Low self-esteem was observed in 42% of the PCOS group versus only 15% of the control group ($p < 0.001$). Conversely, high self-esteem was more frequent in controls (27%) than in the PCOS group

(13%). Normal self-esteem levels were reported in nearly similar proportions between groups (45% vs. 58%).

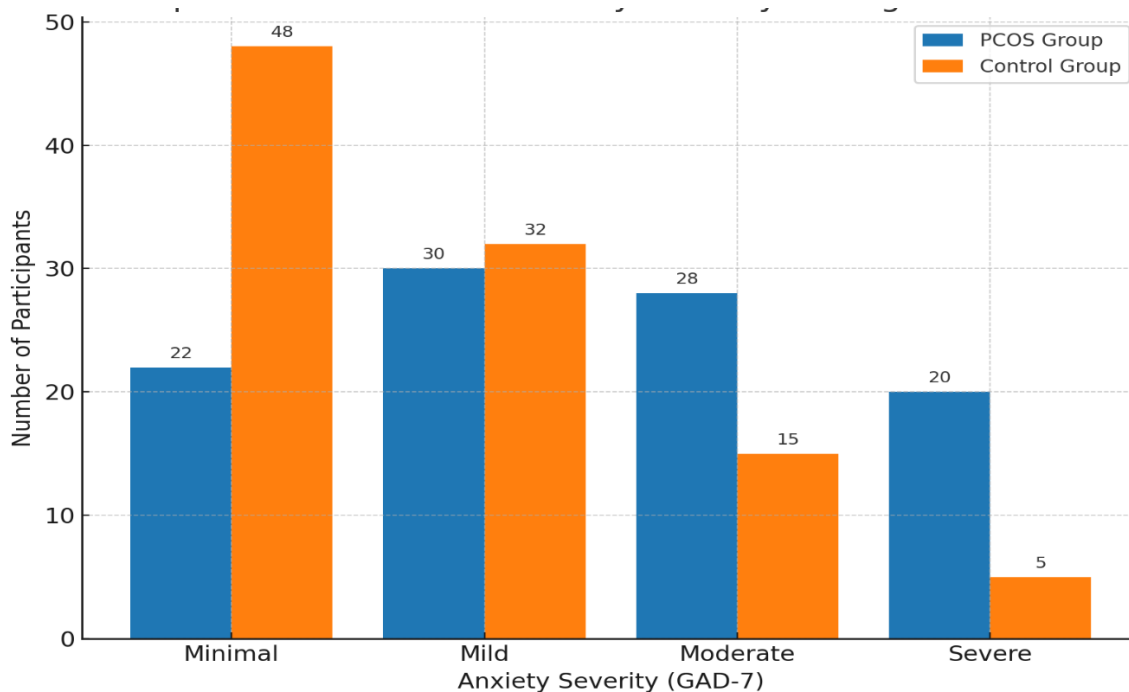
These findings indicate that adolescents with PCOS are substantially more prone to low self-esteem, reflecting the negative psychosocial impact of PCOS-related clinical features on self-image and emotional well-being.



Graph 1: Distribution of Depression severity among adolescent

Graph 1 illustrates that adolescents with PCOS had a substantially higher prevalence of moderate-to-severe depression compared to controls. While nearly half of the control group (46%) reported only minimal symptoms, this was observed in just 18% of the PCOS group. Conversely, moderate (28% vs. 18%), moderately severe (20% vs. 7%),

and severe depression (8% vs. 1%) were disproportionately higher in the PCOS group. Mild depression was comparable in both groups. Overall, the graph highlights a clear trend of greater psychological burden among adolescents with PCOS, with significantly higher rates of clinically relevant depressive symptoms.



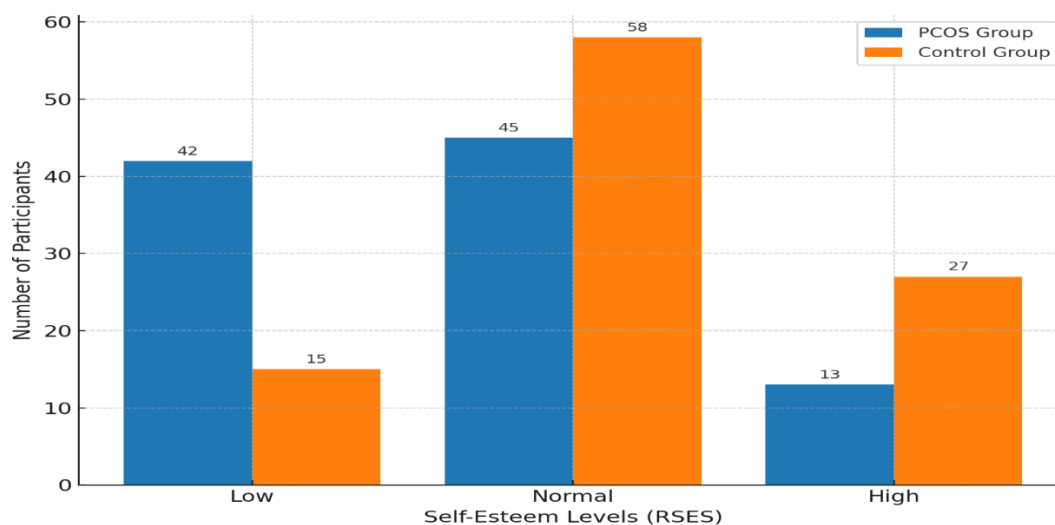
Graph 2: Distribution of Anxiety severity among adolescent

Graph 2 shows that anxiety symptoms were markedly more prevalent among adolescents with PCOS compared to controls. Minimal anxiety was reported by nearly half of the control group (48%)

but only 22% of the PCOS group, indicating better psychological well-being in controls. In contrast, moderate anxiety (28% vs. 15%) and severe anxiety (20% vs. 5%) were considerably higher in

the PCOS group. Mild anxiety occurred at similar rates in both groups (30% vs. 32%). Overall, the graph highlights a significant shift toward

moderate-to-severe anxiety among adolescents with PCOS, underscoring their increased vulnerability to anxiety disorders.



Graph 3: Distribution of Self-esteem levels among adolescent

Graph 3 demonstrates that adolescents with PCOS were more likely to experience low self-esteem compared to their healthy peers. Low self-esteem was reported in 42% of the PCOS group versus only 15% of the control group. Conversely, high self-esteem was more common among controls (27%) compared to adolescents with PCOS (13%). Normal self-esteem levels were reported in almost similar proportions between the two groups (45% vs. 58%). These findings indicate that PCOS has a considerable negative impact on self-perception and confidence in adolescents, contributing to a higher burden of low self-esteem.

Discussion

The baseline characteristics of the present study highlight that adolescents with PCOS had significantly higher BMI, more frequent menstrual irregularities, and a greater prevalence of acne and hirsutism compared to controls, consistent with the classical clinical profile of the disorder. These findings are well supported by recent literature. A meta-analysis by Li et al. (2024) [9] reported that adolescents with PCOS are at a significantly greater risk of depression compared to their peers, with higher overall depression scores, emphasizing the role of obesity and hyperandrogenism in adversely affecting psychological health. Similarly, Wang et al. (2024) [10] demonstrated that adolescent girls with PCOS were 2.4 times more likely to experience depression than non-PCOS counterparts, attributing this to the psychosocial distress associated with hirsutism, acne, and irregular cycles, which mirror the higher prevalence of these features in our study group. In addition, Trivedi et al. (2024) [11], analyzing national inpatient data, found that adolescents with PCOS had significantly greater psychiatric

comorbidities, including mood and anxiety disorders, and recommended routine integration of mental health screening into PCOS management. Together, these studies reinforce the current findings that physical and hormonal manifestations of PCOS, such as elevated BMI and hyperandrogenic symptoms, have profound implications on the mental well-being of adolescents and underline the need for a holistic management approach that addresses both clinical and psychological dimensions.

The present study findings demonstrate a clear association between PCOS and an increased burden of depressive symptoms among adolescents. Using PHQ-9, it was observed that minimal depression was substantially more common among controls (46%) compared to the PCOS group (18%), suggesting that healthy adolescents generally enjoy better psychological well-being. However, the burden shifted significantly in the PCOS group, where the prevalence of moderate (28%), moderately severe (20%), and severe depression (8%) was markedly higher than in controls (18%, 7%, and 1% respectively).

Mild depression appeared in similar proportions in both groups, reflecting that while mild emotional disturbances may be common in adolescence regardless of health status, PCOS substantially increases the risk of clinically significant depressive symptoms. The statistical significance of these differences ($p < 0.001$) highlights the vulnerability of PCOS adolescents to mood disturbances. These results are in line with existing evidence—Li et al. (2024) [9] showed a two-fold higher risk of depression in PCOS adolescents, while Wang et al. (2024) [10] emphasized the impact of hyperandrogenic features such as

hirsutism and acne on body image and self-worth, thereby contributing to depression. Collectively, these findings suggest that depressive disorders in adolescents with PCOS are not only more common but also more severe, warranting routine screening and early psychosocial interventions alongside standard clinical care.

The clear disparity in anxiety severity—measured by GAD-7—between adolescents with PCOS and their healthy peers underscores the substantial psychological burden associated with the condition. Minimal anxiety was significantly more common in the control group (48%) compared to just 22% in the PCOS group. In contrast, adolescents with PCOS exhibited much higher rates of moderate (28% vs. 15%) and severe anxiety (20% vs. 5%), while mild anxiety was similarly prevalent in both groups (30% vs. 32%). This pronounced difference ($p < 0.001$) highlights a marked increase in anxiety disorders among adolescents with PCOS.

These results align with broader meta-analyses: Cooney et al. (2017) [12] found elevated levels of moderate-to-severe anxiety symptoms in individuals with PCOS across age groups, confirming that anxiety is a significant comorbidity in this population. Another recent analysis reported that anxiety symptoms can be as high as 76.7% among women with PCOS—a staggering figure that points to a pervasive mental health challenge.

Moreover, a national inpatient study by Trivedi et al. (2025) [11] found that adolescents with PCOS had notably greater odds of both anxiety and depression, reinforcing the need for mental health integration into PCOS care pathway. Taken together, these findings suggest that anxiety in adolescents with PCOS cannot be overlooked—both hormonal (e.g., hyperandrogenism) and psychosocial factors (e.g., body image concerns, menstrual irregularities) appear to escalate the risk. This underscores the imperative of routine anxiety screening and holistic intervention strategies in this vulnerable group.

The assessment of self-esteem using the Rosenberg Self-Esteem Scale revealed a significantly higher prevalence of low self-esteem among adolescents with PCOS (42%) compared to controls (15%, $p < 0.001$), while high self-esteem was more common in the control group (27% vs. 13%). Normal self-esteem levels were fairly comparable (45% vs. 58%). This troubling pattern reflects the profound psychological impact of PCOS—marked by visible symptoms such as acne, hirsutism, and weight gain—on adolescents' recent research underscores this vulnerability. A 2024 study by Fahimeh Ramezani Tehrani et al. [13] highlights the likelihood of adolescents with PCOS experiencing disturbed eating attitudes and reduced self-esteem. Similarly, Huangfu et al. (2024) [14]

demonstrated that self-esteem significantly mediates the relationship between body dissatisfaction and depression in adolescents with PCOS, with lower self-esteem intensifying depressive symptoms. Additionally, Barbagallo et al. (2024) [15] found that body image distress—frequently stemming from hormonal and metabolic irregularities in PCOS—has a damaging effect on self-esteem and mental health self-image and emotional well-being.

Conclusion

This study demonstrates that adolescent girls with PCOS are significantly more prone to depression, anxiety, and low self-esteem compared to their healthy peers, alongside classical features such as higher BMI, menstrual irregularities, acne, and hirsutism. These findings highlight that PCOS is not only a reproductive and metabolic disorder but also a condition with serious psychological implications. Early screening for mental health disorders and incorporation of counseling and psychosocial support into routine PCOS management are essential to improve overall outcomes and quality of life in this vulnerable population.

References

1. Shukla A, Rasquin LI, Anastasopoulou C. Polycystic Ovarian Syndrome. [Updated 2025 Jul 7]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK459251/>
2. Witchel SF, Oberfield SE, Peña AS. Polycystic Ovary Syndrome: Pathophysiology, Presentation, and Treatment with Emphasis on Adolescent Girls. *J Endocr Soc*. 2019 Jun 14;3(8):1545-1573. doi: 10.1210/js.2019-00078. PMID: 313 84717; PMCID: PMC6676075.
3. Almhoud H, Alattasi L, Baddoura M, Sandouk J, Alkayali MZ, Najjar H, Zaino B. Polycystic ovary syndrome and its multidimensional impacts on women's mental health: A narrative review. *Medicine (Baltimore)*. 2024 Jun 21; 103(25):e38647. doi: 10.1097/MD.00000000000038647. PMID: 3890 5372; PMCID: PMC11191963.
4. Sadeeqa S, Mustafa T, Latif S. Polycystic Ovarian Syndrome-Related Depression in Adolescent Girls: A Review. *J Pharm Bioallied Sci*. 2018 Apr-Jun; 10(2):55-59. doi: 10.4103/JPBS.JPBS_1_18. PMID: 29962792; PMCID: PMC5998697.
5. Ekramzadeh M, Hajivandi L, Noroozi M, Mostafavi F. Psychological Experiences of Adolescent Girls with Polycystic Ovary Syndrome: A Qualitative Study. *Iran J Nurs Midwifery Res*. 2020 Jun 17; 25(4):341-347.

- doi: 10.4103/ijnmr.IJNMR_276_19. PMID: 33014747; PMCID: PMC7494171.
6. Shukla A, Rasquin LI, Anastasopoulou C. Polycystic Ovarian Syndrome. [Updated 2025 Jul 7]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK459251/>
 7. Meczekalski B, Niwczyk O, Kostrzak A, Maciejewska-Jeske M, Bala G, Szeliga A. PCOS in Adolescents-Ongoing Riddles in Diagnosis and Treatment. *J Clin Med*. 2023 Feb 3;12(3):1221. doi: 10.3390/jcm12031221. PMID: 36769869; PMCID: PMC9918268.
 8. Simon SL, Phimphasone-Brady P, McKenney KM, Gulley LD, Bonny AE, Moore JM, Torres-Zegarra C, Cree MG. Comprehensive transition of care for polycystic ovary syndrome from adolescence to adulthood. *Lancet Child Adolesc Health*. 2024 Jun; 8(6):443-455. doi: 10.1016/S2352-4642(24)00019-1. Epub 2024 Mar 27. PMID: 38552655; PMCID: PMC11837223.
 9. Li Y, Zhang J, Zheng X, Lu W, Guo J, Chen F, Liu C. Depression, anxiety and self-esteem in adolescent girls with polycystic ovary syndrome: a systematic review and meta-analysis. *Front Endocrinol (Lausanne)*. 2024 Sep 30; 15:1399580. doi: 10.3389/fendo.2024.1399580. PMID: 39403587; PMCID: PMC11471625.
 10. Wang L, Su S, Xiong T, Wang M, Ding R, Tan H and Zhu M (2024) Prevalence and associated risk factors for depression symptoms in adolescent girls with polycystic ovary syndrome: a hospital-based cross-sectional study. *Front. Public Health* 12:1454415. doi: 10.3389/fpubh.2024.1454415
 11. Trivedi C, Rizvi A, Ashraf S, Husain K, Yadav G, Adams E, Perugula M, Nabi S, Mansuri Z, Jain S. Psychiatric Comorbidities in Hospitalized Adolescents With Polycystic Ovary Syndrome: A Cross-Sectional Study Using the National Inpatient Sample. *Prim Care Companion CNS Disord*. 2024 Nov 7; 26(6):24m03760. doi: 10.4088/PCC.24m03760. PMID: 39546358.
 12. Cooney LG, Lee I, Sammel MD, Dokras A. High prevalence of moderate and severe depressive and anxiety symptoms in polycystic ovary syndrome: a systematic review and meta-analysis. *Hum Reprod*. 2017 May 1; 32(5):1075-1091. doi: 10.1093/humrep/dex044. PMID: 28333286.
 13. Ramezani Tehrani F, Amiri M. Polycystic Ovary Syndrome in Adolescents: Challenges in Diagnosis and Treatment. *Int J Endocrinol Metab*. 2019 Jul 27;17(3):e91554. doi: 10.5812/ijem.91554. PMID: 31497042; PMCID: PMC6679603.
 14. Huangfu H, Li L, Shuai W. Mediating effects of self-esteem and self-compassion on the relationship between body dissatisfaction and depression among adolescents with polycystic ovary syndrome. *Front Public Health*. 2024 Jul 25; 12:1420532. doi: 10.3389/fpubh.2024.1420532. PMID: 39118976; PMCID: PMC11308987.
 15. Barbagallo F, Tiranini L, Placentino C, Mariacci G, Piccinino M, Cucinella L, Calogero AE, Nappi RE. Body Image and Other Mood Vulnerabilities in Adolescents with Polycystic Ovary Syndrome and Metabolic Alterations. *Children (Basel)*. 2024 Apr 26; 11(5):521. doi: 10.3390/children11050521. PMID: 38790516; PMCID: PMC11119722.