

# Adolescent PCOS – Diagnosis and Management

Dr. Sheetal Sachdeva

Sr. consultant Obs & Gynae Apollo Cradle, Moti Nagar, Delhi

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## I. INTRODUCTION

PCOS is increasing across the globe. The prevalence of PCOS in India varies between 3.7 percent to 22.5 percent (1,2). The prevalence of PCOS among adolescents is between 10.7 percent to 22.5 percent (3).

The debate continues over the causes, diagnostic criteria, and best practices for teenagers' polycystic ovary syndrome (PCOS). Recent studies have recognized these weaknesses, and evidence-based expert advice has become more readily available.

While the presence of polycystic or ovary shape (PCOM) is considered an important diagnostic criterion for PCOS among adults, it is not recommended for diagnosis in adolescents; the determination of PCOS in adolescents is based on the presence of ovulatory dysfunction and orogen excessive (5). The most reliable evidence for the presence of ovulatory problems is menstrual intervals of >90 days within the first year following menstrual onset, menstrual intervals that are consistently 21 days or greater than 45 days two or more years after menarche, and the absence of menstrual flow after 15 years or a couple of years after the budding of breasts. The most reliable indicators of an excess of androgens are: moderate to extreme hirsutism, persistent acne that is not responsive to topical treatment, and persistent elevation of the free testosterone and total testosterone levels. A conclusive diagnosis of PCOS is not necessary for treatment.

Treatment can reduce the chance of developing future comorbidities, even without an accurate diagnosis. The delay in

diagnosis, treatment for symptoms, and regular/ frequent symptomology check-ups is a good option. The treatments for PCOS must be tailored according to the symptoms, needs, and preferences of every patient. The goals of treatment are to enhance the quality of life and health-related outcomes over the long term. Lifestyle modifications are the primary treatment for obese and overweight teens with PCOS. COCs, also known as combined oral contraceptives (COC), are the first-choice treatment for acne and menstrual irregularity, and metformin is better than COCs in weight reduction and improvement in dysglycemia. COCs and metformin share the same effects when it comes to hirsutism, but they often have to be combined with other treatments for further improvement of skin-related symptoms.

## Diagnostic criteria

There are three types of diagnostic criteria for adults with PCOS. According to the National Institutes of Health (NIH), criteria call for menstrual irregularity and evidence of an excess of androgen (9). The Rotterdam guideline allows any of the three criteria: menstrual irregularity or irregularity, androgen excess, and polycystic ovary morphology (PCOM) via ultrasound (10). It is recommended that the Androgen Excess and PCOS Society (AE-PCOS) is a good source of diagnosis when there is hyperandrogenism associated with menstrual irregularities as well as PCOM (11). In December 2012, the NIH's Evidence-based Methodology Symposium regarding Polycystic Ovary Syndrome recommended upholding the broad, inclusive Rotterdam criteria while focusing on the distinctive PCOS type. ([Table 1](#)) ([12](#)).

Table 1  
**PCOS phenotypes included in specific diagnostic criteria**

Diagnostic criteria	PCOS phenotype			
	AE	PCOM	OD	AE + PCOM + OD
NIH 1990	+			
Rotterdam 2003/2006	+	+	+	+
AE-PCOS 2006 society	+	+		+
NIH 2012	+	+	+	+

The majority of criteria suggest excluding other causes. Androgen excess, or AE; OD, ovulatory dysfunction; PCOM, polycystic ovary anatomy; PCOS, polycystic ovary syndrome.

In everyday use, the same guidelines have been extended to adolescents. However, these adult-specific diagnostic guidelines are the problem of practical application in adolescents. Many adolescents experience symptoms of excess androgen (e.g., acne) in the peripubertal phase (13). Additionally, normal testosterone levels are not well defined for this age group (14), and the normal ovarian morphology of adolescents coincides with those of women suffering from PCOS (15,16).

Specialists working in the field for years have been aware of the difficulties in diagnosing PCOS for adolescents. A recent consensus document of international pediatric and adolescent specialization societies assessed what the PCOS criteria are supported by sufficient evidence to support their use to make PCOS diagnostics among adolescents (4). The most important findings from this study are concise below.

The authors emphasized the difficulty in distinguishing normal 'physiological anovulation' from real Ovulatory dysfunction. However, they also pointed out that most adolescent menstrual cycles are still between certain parameters. Accordingly, these were suggested as a sign of ovulatory disorder in adolescents:

1. Regular menstrual intervals of >90 days, even during the first year following the menstrual cycle
2. Menstrual intervals consistently 21 days or more than 45 days two or more years following menarche
3. Absence of menstrual cycles within 15 or 2 years following the budding of breasts

A persistent increase in serum-free and total testosterone levels determined by an accredited reference laboratory was considered the best evidence of excess biochemical androgen in an adolescent girl suffering from signs of PCOS. Although mild hirsutism that was isolated was considered normal at the beginning of post-menopausal periods, the presence of severe to moderate hirsutism was recognized as a clinical sign of androgen excess, as was the case with persistent acne not responding to topical treatment. It was suggested to test the condition for the presence of hyperandrogenemia before beginning any medical treatments.

Concerning PCOM, the consensus was that ovarian imaging might be delayed during the diagnosis of PCOS in adolescents until reliable data regarding PCOM exist. This means that diagnosing PCOS in adolescents currently rests on the presence of ovulatory dysfunction and androgen excess.

Important diagnostic considerations that were also that were highlighted in the consensus document included:

- I. The definitive identification of PCOS is not required to begin treatment. Treatment could reduce the chance of developing complications without an accurate diagnosis.
- II. The delay in diagnosing PCOS and allowing the treatment of symptoms and regular monitoring of symptoms is an option that is recommended;
- I. Obesity, hyperinsulinemia as well as insulin resistance, are acknowledged as common among adolescents with PCOS; however, these signs are not to be utilized to diagnose the condition; Other reasons for hyperandrogenemia and irregular menstrual cycle need to be identified before diagnosing PCOS.

### Clinical features

Adolescent girls suffering from PCOS can experience abnormal menstrual cycles, hirsutism, or acne. A stepwise approach to diagnosis is recommended for the case of these patients. History details should include an examination of any exogenous medication's intake. Androgenic steroids and anti-seizure drugs can trigger the same clinical symptoms observed in PCOS, and some medications prescribed to treat acne can be able to mask or eliminate certain PCOS characteristics (17).

Menstrual irregularities in a variety of patterns can be observed in teenagers who suffer from PCOS, such as the primary form of amenorrhea (absence of menarche before 15 years old or 2 to 3 years after the budding of breasts), secondary amenorrhea (more than 90 days without menstrual flow, accompanied by previous menstrual cycles) or oligomenorrhea. Even excessive bleeding from the uterus (4). A recent study found that PCOS is the second most frequent cause of hospitalization for adolescents with abnormal bleeding from the uterus (AUB) or menorrhagia, representing 33% of the admissions (18).

The appearance of acne and hirsutism may be a sign of hyperandrogenemia. The extent and the progression of both conditions must be closely monitored. The Ferriman-Gallwey score is used to determine the severity of the hirsutism (19, 20). Acne severity may be classified as moderate, mild, or severe depending on the type of lesion and the number of lesions (21).

The clinician must be aware of the possibility of other underlying diseases like thyroid dysfunction, elevated prolactin levels, hypercortisolemia, and different causes of virilization that could cause the same clinical manifestation. Biochemical and clinical tests will be required to determine the presence of these conditions.

### Laboratory evaluation

The measurement of free and total testosterone is the most commonly used hormone test to detect the presence of hyperandrogenemia (11, 19, 22). Testing using an extraction procedure with a total testosterone level greater than ng/dL usually indicates an increase in hyperandrogenism (23). Dehydroepiandrosterone sulfate (DHEAS) level is also useful to screen for the primary adrenal source of hyperandrogenemia.

The levels of these hormones should be measured early in the morning. An average afternoon androgen level does not necessarily mean that you have hyperandrogenemia. If a patient has met the requirements for clinical diagnosis of PCOS, but the test does not show hyperandrogenemia, the morning hormone levels may be taken (24, 25). The doctor should be aware that the treatment was started in the interim, hormone levels have been altered, and the patient's health could change.

Further laboratory testing can be customized as required to rule out any other causes of menstrual irregularity or hyperandrogenemia according to the clinical signs. Generally, this workup includes 17-hydroxyprogesterone (17-OHP), androstenedione, free thyroxine (FT4), thyroid-stimulating hormone (TSH), LH, FSH, and prolactin. It is recommended to rule out pregnancy for every patient.

Ultrasonography of the pelvic region is not generally advised for diagnosing PCOS in adolescents. Ultrasonographic criteria for diagnosing PCOS in adolescents are not clear (4). However, pelvic ultrasound may be recommended based on the characteristics of the pelvis to rule out other causes of disease (28). Some experts in this area believe it is important to rule out the possibility of uncommon causes of androgen-producing tumors that affect all girls who present with symptoms of anovulatory and hyperandrogenemia (29).

### Evaluation for comorbidity

PCOS is connected to serious psychological and metabolic mortality (30- 32). The high prevalence of hyperinsulinemia and insulin resistance has been extensively documented within PCOS (4). In addition, obesity and obesity are typical in PCOS patients and can increase their risk (33). Metabolic syndrome and impaired glucose tolerance, as well as type 2 diabetes, are more prevalent in teens who suffer from PCOS (30, 34 - 37), and those suffering from PCOS must be evaluated for the presence of these conditions. The 2-hour blood glucose level following an oral glucose test is believed to be the most reliable test for screening to detect abnormalities in the tolerance of glucose, and some researchers have suggested regular screening for abnormal glucose tolerance by using the oral glucose tolerance test for adolescents suffering from PCOS (38).

The psychological effects of PCOS must not be overlooked (39). An increase in the frequency of anxiety and depression has been proven, and validated tools must be used to recognize these conditions among adolescents with PCOS (31, 32). Additionally, healthcare providers must be aware that subclinical and clinical eating disorders can be common among adolescents suffering from PCOS and should be aware of this when they offer lifestyle counseling (40).

### Management considerations

Since the evidence currently available is not of the highest quality, the treatment options for PCOS should be tailored to the specific needs, presentation, and preferences of every patient, while considering potential adverse consequences (41). The treatment goals are to enhance the overall quality of life and health outcomes.

Lifestyle modifications are the primary treatment for overweight and obese teenagers who suffer from PCOS. Menstrual irregularity is improved, lowered risk of cardiometabolic illness, and a reduction in androgen excess can be achieved through losing weight (42- 46).

Contraceptives with a combination of oral and spermicides (COC) are a top treatment option for PCOS since they can treat some of the symptoms associated with PCOS (6). Furthermore, COC provides contraceptive coverage for patients that are active sexually. The estrogen-progesterone combination overwhelms the endogenous hypothalamic-pituitary-ovarian (HPO) axis and thereby intrudes the pathophysiologic mechanism of PCOS, consequential in reduced ovarian androgen production.

Furthermore, COC increases sex hormone binding globulin and further decrease the excess of androgen (47). The progesterone portion of the COC can also block estrogen's unopposed action and prevent the development of endometrial hyperplasia.

COC is a top option to regulate any menstrual irregularity like amenorrhea or oligomenorrhea. Menorrhagia, and the AUB (6, 19). The improvement in the menstrual cycle is typically noticed in the first two to three months. Hyperandrogenemia can also be observed to improve, and testosterone levels can be tested again at the end of the third-month treatment to determine a reduction. The duration of treatment with COC is not yet determined. There has been a suggestion that a test of the COC could be considered after at least one year of treatment to allow healing of the HPO axis and to see whether menstrual irregularity is restored spontaneously. However, the advantages of this approach have not been determined and must be evaluated against the potential risks of pregnancy.

COC is also an option for hyperandrogenemia-related skin manifestations. Improvements have been observed in acne and the progression of hirsutism using COC. While contraceptives that contain only progestin can be used to treat menstrual irregularity, their effect on hyperandrogenism has been less, which is why fewer improvements in the appearance of the skin are apparent with these strategies.

Metformin is a recommended treatment for women suffering from PCOS who have type 2 diabetes or have impaired tolerance to glucose that is not improved by lifestyle modifications (6). Recent meta-analyses of random controlled trials that evaluated the efficacy of metformin compared to COC in treating PCOS in adolescents showed metformin to be just as efficient as COC in treating sexual hirsutism. Metformin was shown superior to COC for weight loss and improved dysglycemia. COC was preferred in menstrual control. However, the authors cautioned that the overall quality of research is low, and further studies of high quality are required to address the key issues concerning treatment for PCOS in teenagers (41).

In order to achieve further improvement in the appearance of skin problems, further treatment is usually required in conjunction with COC or metformin. Spironolactone is an effective anti-androgen that can be used alongside COC and metformin. Spironolactone is a potent remedy for menstrual irregularities and the cutaneous manifestations of hyperandrogenism. However, it does not ameliorate metabolic issues (48, 49). Ganie and coworkers discovered that the combination of metformin with spironolactone was superior to any drug in improving menstrual irregularity and hirsutism, as well as the levels of serum androgens insulin resistance (50). Because spironolactone is Teratogens, it is important to combine it in conjunction with a secure contraception method for teens who are sexually active. In a pilot study the occasional use of oral finasteride in moderate doses was shown to be effective in treating hirsutism of teens suffering from PCOS or chronic or idiopathic persistent hirsutism. (51).

Procedures for removing hair that are cosmetic may provide better results as compared to pharmacotherapy. It is also accessible to patients with no requirement for prescription. Electrolysis and laser hair removal procedures are gaining popularity as they

become more efficient and cost-effective. Treatments for hair loss include eflornithine, an oil that is beneficial to people suffering from hirsutism however it should continue to be utilized for prolonged duration to ensure its efficacy.

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#### AUTHORS

**First Author** – Dr. Sheetal Sachdeva  
Sr. consultant Obs & Gynae Apollo Cradle, Moti Nagar, Delhi