

# Clinical Study of Prevalence of Polycystic Ovarian Syndrome in Adolescent Girls with Irregular Menstruation

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## Abstract

**Background:** Polycystic Ovarian Syndrome (PCOS) accounts for significant healthcare costs, emotional distress and significant impact on quality of life of women. Even though a fairly common problem it is a complex trait with unclear etiology. The present study was conducted to study various clinical presentations in the adolescent girls with polycystic ovarian syndrome having menstrual irregularities. **Aims and Objectives:** To study the anthropometric measurements among PCOS patients and to find the association of various risk factors. **Material and Methods:** It was an observational, cross-sectional study conducted in Out-patient department of Obstetrics and Gynecology at a tertiary healthcare center in Maharashtra. This study was conducted amongst the adolescent girls coming to the OPD of Obstetrics and Gynecology with irregular menses. **Results:** We evaluated the study subjects according to the Rotterdam's criteria. We observed that 51.96% cases fulfilled two of the three criteria, while 29.13% cases fulfilled all the three criteria from Rotterdam's criteria for PCOS. Oligomenorrhea was noted among 46.45% subjects, followed by hypomenorrhea among 32.28% cases. Primary amenorrhea was observed among 21.25% cases. Secondary amenorrhea was seen as the presenting symptom in 4.72% cases. **Conclusions:** Adolescents who had irregular menses and signs of increased androgen secretion should undergo investigations and must be treated. Prompt treatment following early diagnosis of PCOS helps improve quality of life in young adolescent girls.

**Keywords:** Menstrual Irregularities, Rotterdam's Criteria, Modified Ferriman-Gallwey Score, PCOS

## 1. Introduction

Polycystic Ovarian Syndrome [PCOS] is a hyperandrogenic state. Recently, a few trials have been conducted in adolescent school girls which showed a prevalence of PCOS of 9.13 %<sup>1</sup> along with chronic oligoanovulation and polycystic ovaries<sup>2,3</sup>. It is also associated

with psychological illness, including depression and other mood disorders.

This condition is a complex presentation of hirsutism, menstrual abnormalities, puberty and obesity. Women with this disorder are estimated to have had at least five visits to various consultants prior to the final diagnosis. They may have had visits to the surgeon for obesity treatment,

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the dietician for dietary therapy, the dermatologist for wrinkles, hair and skin ailments, the psychiatrist for depression due to body perception disorders, and the gynecologist for menstrual abnormalities. when they are hospitalized for isolated morbidities, the diagnosis of multidimensional syndrome is more delayed<sup>3-5</sup>.

PCOS accounts for substantial costs in health treatment. Anxiety has been identified as having an effect on the quality of life of the patient. PCOS is common issue with a complex triad of symptoms with a vague etiology. A number of cases remain undiagnosed in the population. As a result, risk management in the form of a survey would be ideal for early identification of this disorder in order to enable young girls to seek prompt care and avoid long-term complications. Studies in early adulthood will also offer additional insights into the natural history of the disease and may also reveal some novel insights into its health risks. With this context, this research aims to determine the incidence of PCOS in teenage girls with menstrual abnormalities<sup>3,4</sup>.

The present study was conducted to study various clinical presentations in the adolescent girls with polycystic ovarian syndrome having menstrual irregularities and to study their anthropometric measurements and to find the association between the risk factors.

## 2. Materials and Methods

It was an observational, cross-sectional study conducted in the department of Obstetrics and Gynecology of Dr. Vasantrao Pawar Medical College Hospital and Research Centre, Nashik, Maharashtra. The participants were adolescent girls coming to the OPD of Obstetrics and Gynecology with irregular menses. Total 127 participants were included in the study after satisfying the exclusion and inclusion criteria.

**Inclusion criteria:** Adolescent girls of age group 11–19yrs coming to the OPD with C/O irregular menses, Oligomenorrhea, Amenorrhea {Primary or Secondary} were included in the present study.

**Exclusion criteria:** Other causes of irregular menses or hyperandrogenism. eg- thyroid disorders, hyperprolactinemia, adrenal hyperplasia to be ruled out.

Approval from the Institutional ethics committee was obtained. Participants were given all information about the study and a written informed consent was obtained before inclusion in the study.

A detailed history was taken including the obstetric [if married], menstrual, past, personal and family history of the participants. General physical examination was done in details for noting the vitals, weight, BMI, waist circumference, secondary sexual characteristics. Signs of Hyperandrogenism in the form of hirsutism, acne, thinning scalp hair were noted. Signs of insulin resistance in the form of obesity and acanthosis nigricans, galactorrhea, thyroids swelling and other signs of endocrinal disorders were looked for along with systemic examination. This was followed by per abdominal examination. Per speculum for cervix and vagina, per vaginal examination done only in sexually active participants to note the uterine size, cervix, bilateral fornices, cervical motion tenderness.

Ultrasound demonstrating  $\geq 12$  Antral Follicles in One Ovary or Ovarian volume  $>10$  cm was diagnosed as Polycystic ovaries<sup>2</sup>.

Analysis was done clinically, biochemically and statistically depending on various clinical presentations along with irregular menses. These features were noted as per the proforma given to participants and was documented in a tabular form.

The collected data was entered with the help of Microsoft Excel spreadsheets version 2016. The data was presented in the form of tables and graphs for frequency analysis, to know the measures of central tendency and to study the distribution of the data. Statistical analysis is done using IBM SPSS version 22.0 software.

## 3. Results

### 3.1 Age Wise Distribution of the Study Cases

In the present study, assessed the age distribution of the cases enrolled observed that the most of the cases were in the age group of 17–19 years (60.62%), followed by 14–16 years (29.92%), and 11–13 years (9.44%). The mean age of participants was  $16.65 \pm 2.02$  years (Table 1)

### 3.2 Anthropometric Measurements

Body mass index and Waist to hip ratio were assessed. Waist to hip ratio was more than 0.85 among 36.22% patients, while obesity was observed among 37.79% patients. The waist to Hip ratio  $> 0.85$  is suggestive of obesity (Table 1). 54.33% cases had normal BMI, while 22.83% cases were overweight, 9.45% cases were obese,

**Table 1.** Distribution of anthropometric and demographic information of the study subjects

Parameters			Number of cases	Percentage
BMI	<18	Underweight	10	7.87
	18-24	Normal weight	69	54.33
	25-30	Overweight	29	22.83
	>30	Obese	12	9.45
	>40	Morbid Obesity	7	5.51
WHR		Less than 0.85	81	63.77
		More than 0.85	46	36.22
Age group		11-13	12	9.44
		14-16	38	29.92
		17-19	77	60.62
		Total	127	100
Mean age			16.65 ± 2.02 years	

5.51% cases were morbidly obese. 7.87% cases were found underweight.

### 3.3 Clinical Presentation of the Study Participants

It was observed that majority of the cases presented with hirsutism as the presenting complaint (85.03%), followed by 52.75% cases presented with acne, 51.96% cases presented with acne + hirsutism, 37.79% cases presented with obesity and 32.28% cases presented with all acne + hirsutism + obesity. All cases presented with irregularity in their menstrual cycle (Table 2).

### 3.4 Prevalence of PCOS (Rotterdam Criteria)

In the present study we evaluated the study subjects according to the Rotterdam's criteria. We observed that 51.96% cases fulfilled two of the three criteria, while 29.13% cases fulfilled all the three criteria from Rotterdam's criteria for PCOS, while hirsutism was noted among 85.03% subjects. Hence, the prevalence of PCOS among the cases presenting with menstrual irregularities

ranges between 29.13% (3 criteria) to 30.70% – 51.96% (2 criteria), and 85% when considered only one parameter (hirsutism) among the high-risk subjects.

Menstrual irregularities & hyperandrogenism were observed among 51.96% cases, while menstrual irregularities & USG signs of PCOS were observed among 32.28, signs of hyperandrogenism & USG signs of PCOS were observed among 30.70% cases. A combination of menstrual irregularities, signs of hyperandrogenism & USG signs of PCOS were observed among 29.13% cases (Table 2).

### 3.5 USG Criteria

In the present study the USG criteria was suggestive of PCOS among 32.3% study subjects in their USG examination (Table 2).

### 3.5 Menstrual Irregularities among the Study Participants

Majority of the participants had oligomenorrhea (46.45%), followed by hypomenorrhea among 32.28% cases and primary amenorrhea was observed among

**Table 2.** Clinical presentation and diagnosis

Parameters		Number of cases	Percentage (Prevalence)
Criteria from Rotterdam's criteria	Signs of menstrual irregularities + signs of hyperandrogenism	66	51.96
	Signs of menstrual irregularities + USG signs of PCOS	41	32.28
	Signs of hyperandrogenism + USG signs of PCOS	39	30.70
	Signs of menstrual irregularities + signs of hyperandrogenism + USG signs of PCOS	37	29.13
Clinical Presentation	Hirsutism	108	85.03
	Acne	67	52.75
	Obesity	48	37.79
	Acne + Hirsutism	66	51.96
	Acne + Hirsutism + Obesity	41	32.28
	USG signs of PCOD	41	32.28
	Irregular menstrual cycle	127	100
Menstrual irregularities	Oligomenorrhea	58	45.66
	Hypomenorrhea	40	31.49
	Primary Amenorrhea	26	20.47
	Secondary amenorrhea	6	4.72

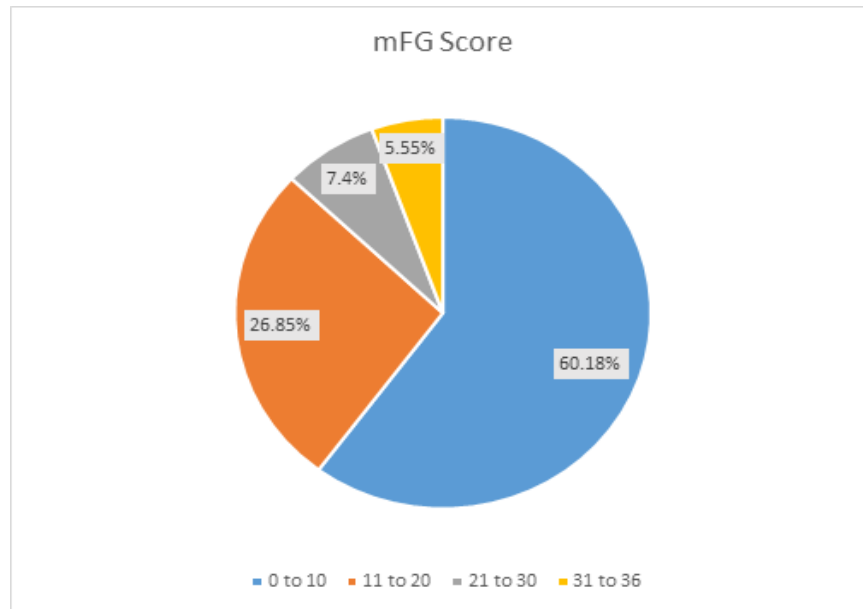
21.25% cases. 4.72% cases presented with secondary amenorrhea. (Table 2)

### 3.6 Hirsutism According to Ferriman Gallway Score

“The Ferriman–Gallway” score was used in evaluating and quantifying hirsutism. (Table 2). Hair growth is rated

from 0 (no growth of terminal hair) to 4 (extensive hair growth) in each of the nine locations. A patient may have a score between 0 & 36. Ethnicity plays a major role in hair growth patterns and should always be considered while evaluating androgen excess.

Participants with hirsutism were classified according to Ferriman Gallway score (mFG), based on sites involved



**Chart 1.** Distribution of study subjects according to their Ferriman Gallway Score.

in the body. Majority of the subjects had mFG score between 0 to 10(60.18%), followed by 26.85% cases with mFG score in the range of 11–20, 7.4% cases had the score in the range of 21–30 and 5.55% cases had mFG score between 31 to 36 (Chart 1). The mean mFG score observed among the cases presented with hirsutism was observed to be  $11.19 \pm 8.10$ .

## 4. Discussion

Polycystic ovarian syndrome (PCOS) was first reported by Stein and Leventhal in 1935 in a case series of seven women<sup>5</sup>. PCOS is now recognized as the most prevalent endocrine disease in women of reproductive age (5 percent–7 percent), with primary features of irregular menses, increased androgens, and polycystic-appearing ovaries on USG. However, since its initial description in 1935, the diagnostic criteria of PCOS have undergone many changes<sup>6</sup>.

### 4.1 Age-wise Distribution

Majority of the cases belonged to 17–19 years age group (60.62%), followed by 14–16 years (29.92%), and 11–13 years (9.44%). The mean age of presentation was  $16.65 \pm 2.02$  years. Gupta *et al.*<sup>7</sup>, the mean age of presentation

of subjects tested was  $18.47 \pm 0.482$  years, whereas the age range was 17–24 years (Table 3). In their analysis, Chhabra *et al.*, observed that the mean age of presentation was  $24.18 \pm 5.61$  years<sup>8</sup>. Yildif *et al.*<sup>9</sup> observed that the mean age of the study participants was  $29.1 \pm 7.1$  years. Gupta *et al.* observed the prevalence of PCOS among teenage girls and found that 8.20 per cent of girls had PCOS according to the Rotterdam criterion.

### 4.2 Anthropometric Measurements

On evaluation of Body Mass Index, we found 54.33% cases had normal weight, while 22.83% cases were overweight, 9.45% cases were obese, 5.51% cases were morbidly obese. 7.87% cases were found underweight. Gupta *et al.*<sup>7</sup> observed that BMI  $\geq 25$  (P value  $< 0.0001$ ) and waist hip ratio  $\geq 0.85$  ( $< 0.0001$ ) had the strongest association with PCOS. Our results were in agreement with Gupta *et al.* all; waist to hip ratio was  $\geq 0.85$  among 36.22% patients, while obesity was observed among 37.79% patients. Findings in present study showed risk of PCOS higher in obese which is similar to study done by Yildiz *et al.*<sup>9</sup> and study of Majumdar *et al.*<sup>10</sup> Both risk factors, BMI  $\geq 25$  (P  $< 0.0001$ ) and waist hip ratio  $\geq 0.85$  ( $< 0.0001$ ) were closely correlated with PCOS<sup>7</sup>.

### 4.3 Clinical profile as per Rotterdam's Criteria

On evaluation of the study subjects according to the Rotterdam's criteria, we observed that majority of the cases presented with hirsutism as the presenting complaint (85.03%). 51.96% cases fulfilled two of the three criteria, while 29.13% cases fulfilled all the three criteria from Rotterdam's criteria for PCOS. Hence, the prevalence of PCOS among the cases presenting with menstrual irregularities ranges between 29.13% (3 criteria) to 51.96% (2 criteria).

Signs of menstrual irregularities + signs of hyperandrogenism were observed among 51.96% cases, while Signs of menstrual irregularities + USG signs of PCOS were observed among 32.28%, Signs of hyperandrogenism + USG signs of PCOS were observed among 30.70% cases and Signs of menstrual irregularities + signs of hyperandrogenism + USG signs of PCOS were observed among 29.13% cases.

In our study, of participants with menstrual irregularities most of the cases presented with hirsutism (85.03%), followed by 52.75% cases presented with acne, 51.96% cases presented with acne + hirsutism, 37.79% cases presented with obesity and 32.28% cases presented with all acne + hirsutism + obesity. All cases presented with irregularity in their menstrual cycle (hypomenorrhea, oligomenorrhea and primary amenorrhea). Gupta et al.<sup>2</sup>, found 19(3.80 per cent) girls had oligo/anovulation, 8(1.60%) girls had hirsutism (hyperandrogenic manifestation), 29(5.80%) girls had

both oligo/anovulation and hirsutism, 409(81.80%) girls had acne, and 103(20.60%) girls complained of hair loss<sup>7</sup>. Majumdar et al. in their study observed that 76.4% showed oligo ovulation or anovulation, 66.4% women had features of hyperandrogenism (clinical) and 38.8% women had both<sup>10</sup> (Table 3).

### 4.4 Hirsutism According to Ferriman Gallway Score

In the present study, majority of the subjects had mFG score between 0 to 10 (60.18%), followed by 26.85% cases with mFG score in the range of 11–20, 7.4% cases had the score in the range of 21–30 and 5.55% cases had mFG score between 31 to 36. The mean mFG score observed among the cases presented with hirsutism was observed to be  $11.19 \pm 8.10$ . Chhabra et al. in their study observed that 15% patients had severe (mFG score 26-36), 52.5% had moderate (mFG score 17–25) and 32.5% patients had mild hirsutism (mFG score 9–16)<sup>8</sup>.

### 4.5 Menstrual Irregularities

The most common menstrual irregularity found in our study was; oligomenorrhea (46.45%), followed by hypomenorrhea among 32.28% cases, and primary amenorrhea was observed among 21.25% cases. 4.72% cases presented with secondary amenorrhea. Chhabra et al., in their report, found acne in 55 per cent and menstrual symptoms in 40 per cent of patients. Obesity (BMI >25) was associated with 37.5 percent and AGA was associated with 27.5 percent of patients. 23.08 per

**Table 3.** Comparison of clinical profile with previous studies.

Parameters	Studies		
	Present study	Gupta M et al <sup>[7]</sup>	Majumdar A et al <sup>[10]</sup>
Hirsutism	85.3%	81.60%	-
Acne	52.75%	20.60%	81.80%
Obesity	37.79%	-	-
Acne + Hirsutism + Obesity	32.28%	-	5.80%



cent patients had mild hirsutism with acne, 61.9 per cent had moderate hirsutism with acne, and 100 per cent of those with extreme hirsutism had acne. 7.7% with minor hirsutism had AGA. 23.8% with mild hirsutism had AGA, while 83.33 percent patients with extreme hirsutism had AGA<sup>8</sup>.

#### 4.6 Association of Risk Factors

In their research, Majumdar et al.<sup>10</sup> Prevalence of menstrual abnormalities [79.2% vs. 44%] Clinical hyperandrogenism (74.2 % vs. 50.6 %) was statistically significant and slightly higher in the obese category, while core android obesity (width to hip ratio >0.85) was comparable in all categories, regardless of body weight (47.7 % vs. 38 %)<sup>10</sup>. They suggested that PCOS is a genetically heterogeneous disease with an increased risk of asthma, diabetes and EH. Diabetes and EH tend to be more common in obese, placing them at a higher risk of morbid complications at a significantly younger age than slim women.

In 2000, a multicenter analysis involving seven metropolitan cities (Chennai, Bangalore, Hyderabad, Mumbai, Calcutta and New Delhi) in India between the ages of 20 and 40 years showed that the prevalence rate of obesity was 31 per cent. Our survey found a 37.5 percent prevalence rate of obesity for women with PCOS<sup>11-13</sup>.

### 5. Conclusions

According to Rotterdam's criteria, the prevalence of PCOS among the cases presenting with menstrual irregularities ranges between 29.13% (3 criteria) to 51.96% (2 criteria). The mean age of participants was  $16.65 \pm 2.02$  years.

Hirsutism and acne are the commonest complaints found among the study subjects. The mean mFG score observed among the cases presented with hirsutism was  $11.19 \pm 8.10$ .

Among menstrual irregularities, oligomenorrhea was found to be the commonest complaint, followed by hypomenorrhea. 22.83% cases were overweight, 9.45% cases were obese, 5.51% cases were morbidly obese. Most importantly the age of presentation is decreasing. Girls with irregular menses and hyperandrogenism should

have early evaluation and treatment. Early diagnosis and its prompt management will help improve quality of life.

More such multi-centric studies should be conducted to find out the impact of early diagnosis and treatment on long term complication prevention. Health education in school girls needs to be strengthened to provide an awareness of PCOS, lifestyle and dietary modification. There is a case to be made for inclusion in school health program for early detection and treatment of PCOS, more so in obese.

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