

## Original Article

# Polycystic Ovarian Syndrome Prevalence in Adult Unmarried Females Visiting a Territory Care Hospital

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## Abstract

**Background:** Among women of reproductive age, polycystic ovarian syndrome (PCOS) is one of the most common endocrine and metabolic illnesses.

**Objective:** To determine the prevalence of Polycystic Ovarian Syndrome (PCOS) in unmarried adult females visiting a Territory Care Hospital and to raise awareness of PCOS, promote early and successful medical interventions, and support the overall health of young, single females.

**Methodology:** In order to determine rate of prevalence of PCOS from May to November 2022, 180 unmarried females between the ages of 16 and 24 who were presenting to an outpatient gynaecology and dermatology clinic with menstrual irregularities or symptoms of hyperandrogenism participated in this prospective cross-sectional study. In accordance with Rotterdam, NIH, and AE-PCOS diagnostic standards. Menstrual irregularities (MI) are found, and the clinical hyper-androgenism was determined by utilising the modified Ferriman-Gallwey score to assess hirsutism. Prolactin, thyroid-stimulating hormone, and androgen hormone levels in blood were measured.

**Results:** This research showed acne, Oligomenorrhea, and hirsutism are the 3 most prevalent complaints in this study, with a prevalence rate of 55.6 percent for PCOS among all cases presented. This study also demonstrated a link between PCOS, sedentary lifestyles, and bad eating practises. LH and prolactin levels were significantly different between PCOS and non-PCOS. There is an abnormal LH/FSH ratio (2:1). Additionally, it demonstrates that ovarian volume significantly differed between those with and without PCOS.

**Conclusions:** Exercise and healthy eating are crucial lifestyle changes that can hopefully prevent PCOS.

**Keywords:** Hyperandrogenism (HA), Polycystic Ovary Syndrome (PCOS), Menstrual Irregularities (MI), Hirsutism.

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## Introduction

The Stein-Leventhal syndrome, occasionally referred to as the PCOS, is a common metabolic and reproductive endocrinopathy. According to several research, prevalence in men and women of the reproductive age ranges from 5 to 20 percent.<sup>1</sup> The main reproductive issues that young women with PCOS experience include hyperandrogenism, irregular menstruation, infertility, and persistent anovulation. Infertility affects up to 40% of women with PCOS and increases by a factor of ten.<sup>2</sup> Due to linked endocrine, metabolic, and gynaecological problems that affect the ovary's structure and functionality, PCOS decreases fertility. When follicles attain a diameter of 4 to 8 mm, normal follicular development was disrupted, which prevented the development of the dominant follicle and prevented

ovulation from occurring. Hyperandrogenism results from enhance the resistance of insulin, which raises the ratio of LH/FSH and lowers SHBG. Additionally, research have shown that these women have poor pregnancy outcomes.<sup>3</sup> The NIH, the Indian Androgen Excess-PCOS Society (AE-PCOS), or the Criteria of Rotterdam are three alternative diagnostic criteria that can be used to identify PCOS.<sup>4</sup> Although non of them was included in recommendations and should utilised for the purposes of diagnosis, resistance of insulin and the obesity are thought to be inherent to PCOS.<sup>5</sup> PCOS is underdiagnosed instead of their high prevalence and effects on the reproductive health.<sup>6</sup> The age of presentation and symptomatology vary widely. Adolescent girls are more likely to gain weight and have high BMIs due to the recent trends of the sedentary lifestyles and foods rich in carbohydrate and fat. These

Authorship Contribution: <sup>1,3</sup>Substantial contributions to the conception or design of the work, acquisition, analysis, or interpretation of data for the work, <sup>5</sup>Drafting the work or revising it critically for important intellectual content, <sup>2</sup>Final approval of the version to be published, <sup>3</sup>Active participation in active methodology, <sup>4-6</sup>Active participation in active methodology

lifestyle modifications thus raise the risk of PCOS in these women, which includes hormonal imbalance, menstruation issues, infertility, and altered pregnancy outcomes. PCOS is very common in women who are infertile. In addition to having an effect on reproductive outcomes, PCOS also has delayed symptoms that, if untreated, might pose serious dangers to cardiovascular and metabolic health. Early lifestyle changes, parental counselling, and improved awareness and attitudes among women concerning PCOS are all essential for raising the quality of life for PCOS patients.<sup>7</sup> Women with PCOS have the constellation of the symptoms that has a high influence on their life's quality. These women have an increased chance of developing a number of morbidities, including infertility, cancer, psychiatric problems, type II diabetes, obesity, insulin resistance, and CVD.<sup>8</sup> In order to raise awareness of PCOS, encourage earlier successful medical interventions, and support the women's healthy lives, the goal of the study was to ascertain prevalence of PCOS among youngest, single females.

## Methodology

180 of the 15300 cases that were seen in outpatient Gynaecology and Dermatology clinics between May and November 2022 for the study presented with symptoms that might have been associated with PCOS (1.17 percent). Only hundred cases with PCOS are identified (0.65 percent). These PCOS cases were divided into 2 groups, one less than the 20 years old and other more than 20 years of age, based on their age. Clinical and laboratory symptoms and indicators of hyperandrogenism are used to diagnose PCOS in people under the age of 20. The two of the three Rotterdam criteria, which include laboratory and clinical symptoms & evidence of the ovulatory dysfunction, hyperandrogenism, and PCOs on the ultrasound, are used to diagnose PCOS in patients who have had it for more than 20 years.

**Inclusion criteria:** Between 16 and 24 years old, menstrual irregularity, Acne, hirsutism, or the androgenic are obese (BMI greater than 30 kg/m<sup>2</sup>).

**Exclusion criteria:** Virilizing tumours or other recognised malignancies. Cushing syndrome, thyroid issues, endocrine problems.

From the cases, a thorough history was extracted that included names, ages, places of residence, and occupations. Menstrual history was collected to determine menarche age, pattern, and frequency. We

also inquired about your eating and workout routines. Chronic anovulation is defined by menstrual abnormalities as oligomenorrhea or amenorrhea lasting three months (interval of intermenstrual more than the 35 days). Regular cycles are well-defined as 9–16 cycles with period of 21–35 days within a year, or cycles with no more than a 4-day variance in duration.

Transabdominal ultrasound has been used to diagnose PCOS in cases older than 20 years, but recent research has shown that it is not necessary for cases younger than twenty years. Instead, the PCOS diagnosis in the cases younger than twenty years depends on the clinical symptoms of patient, ovulatory dysfunction, & hormonal image of the hyper-androgenism as represented by the DHEA-S and Testosterone. In women who were menstruation, ultrasound was done between cycle days 2 and 7; in amenorrhic women, it was done after withdrawal bleeding.

Tourniquets were used on the patient's arm to draw attention to the veins so that a venous blood sample could be obtained.

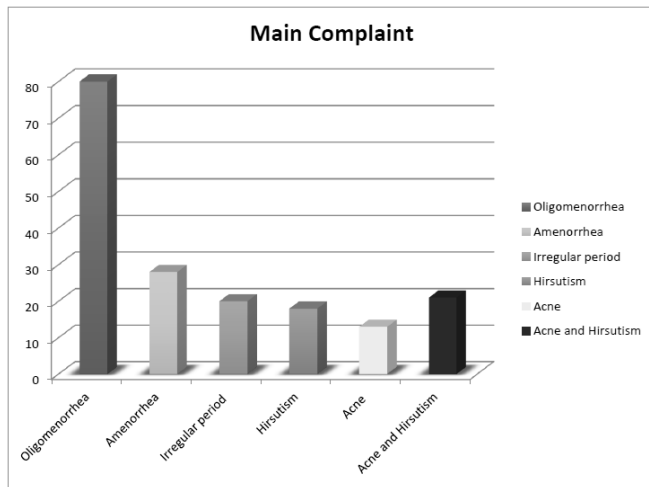
Between cycle days 2 and 5, menstrual females had their LH, FSH, Prolactin, testosterone and DHEA-S, levels checked. Blood was drawn two to five days after the bleeding withdrawal in the event of amenorrhea withdrawal. The oral progesterone pills are used to stop withdrawal bleeding. The patient should have withdrawal bleeding after discontinuing the medications.

Enzyme immunoassay (EIA) kits were used to measure the levels of serum FSH, LH, and prolactin. Calculated was the ratio of FSH: LH. Serum FSH:LH ratio 1:2 is considered elevated, whereas a value below this was regarded as normal.

Microsoft Excel software was used to note the data and measurements. The SPSS software was then used to performed the following tests were which determine that there is significant difference statistically and whether a qualitative variable was associated with the quantitative data, which was represented as mean SD and qualitative data as numbers and percentages (X<sup>2</sup>). The Mann Whitney P value was set at 0.05 for the significant results and 0.001 for the very significant result for differences along the quantitative independent groups.

## Results

The most frequent dermatological and gynaecological complaints were hirsutism and acne, respectively. Figure 1



**Figure 1. Major complaint amongst studied women.**

According to this study, oligomenorrhea was the most typical gynaecological symptom in the PCOS group, but acne and hirsutism were the most typical dermatological symptom. (Table I)

This study revealed a strong correlation between PCOS incidence and use of the fast food, chocolate, and soft drinks. (Table II).

LH and prolactin levels were statistically different between PCOS and non-PCOS women, DHEA-S, although testosterone, and the levels of FSH were not different statistically (Table III).

But there is no significant difference statistically between the testosterone, DHEA-S, and FSH. (Table IV)

LH and prolactin levels were statistically different in non-PCOS & PCOS females over the age of 20. However, there were no statistically significant variations in testosterone, DHEA-S, or FSH. (Table V)

In this table, there was no difference in the stroma of highly echogenic bright ovarian in between non-PCOS & PCOS women, although there is a significant difference statistically in the follicle number of 12 or even more, the peripheral distribution of the follicles, and the volume of ovarian. (Table VI).

### Discussion

In this study, out of 15300 cases that have seen at the dermatology and gynaecology department outpatient clinics during the study, 180 cases (1.17%) presented with symptoms that might indicate PCOS; only 100 cases (0.65%) were ultimately determined to have

**Table I: Clinical presentation comparison.**

Variable	non-PCOS (mean±SD)		PCOS (mean±SD)		p	X <sup>2</sup>
	N	%	N	%		
Complaint						
Amenorrhea	17	21.25	11	11	0.074	3.12
Oligomenorrhea	30	37.5	50	50	0.02	5.21
Irregular period	10	12.5	10	10	0.28	0.87
Hirsutism	7	8.7	11	11	0.41	0.7
Acne	8	10	5	5	0.19	1.66
Hirsutism and Acne	8	10	13	13	0.53	0.39

**Table II: Comparison of life-style habits.**

Variable		non-PCOS (mean±SD)		PCOS (mean±SD)		p	X <sup>2</sup>
		N	%	N	%		
Healthy diet	Yes	32	40	28	28	0.08	2.88
	No	48	60	72	72		
Soft drink	Yes	30	37.5	78	78	0	30.3
	No	50	62.5	22	22		
Daily sport	Yes	20	25	15	15	0.09	2.87
	No	60	75	85	85		
Fast food	Yes	21	26.3	54	54	0.0001	14.08
	No	59	73.7	46	46		
Chocolate eating	Yes	14	17.5	45	45	0	15.22
	No	66	82.5	55	55		

**Table III: Comparison of Hormonal level.**

Variable	non-PCOS (mean±SD)		PCOS (mean±SD)		p	test (M.W)
	Mean	SD	Mean	SD		
LH	9.1	1.6	13.5	2.4	0.001	4.8
Prolactin level	10.1	2.6	17.3	3.8	0.001	7.6
FSH	5.5	1.4	6.2	1.1	0.089	1.6
Testosterone	1.3	0.1	2.05	0.8	0.1	1.3
DHEA-S	5.1	1.4	6.2	1.8	0.13	1.5

**Table IV: Comparison of Hormonal level of women having age less than twenty years.**

Variable	non-PCOS (mean±SD)		PCOS (mean±SD)		p	test (M.W)
	mean	SD	mean	SD		
LH	8.8	2.6	13.7	2.2	0.001	5.1
Prolactin	9.8	1.6	17.1	3.4	0.0003	8.2
FSH	5.7	1.8	6.1	1.8	0.082	1.5
Testosterone	1.5	0.08	2.03	0.12	0.099	1.6
DHEA-S	4.7	1.1	5.1	0.3	0.24	1.1

**Table V: Comparison of Hormonal level of women having age more than twenty years.**

Variable	non-PCOS (mean±SD)		PCOS (mean±SD)		p	test (M.W)
	mean	SD	mean	SD		
LH	9.3	2.8	13.7	3.7	0.002	4.3
Prolactin	11.2	3.2	17.8	4.2	0.001	6.2
FSH	5.8	1.1	6.4	1.5	0.096	1.51
Testosterone	1.5	0.12	2.14	0.2	0.089	1.6
DHEA-S	5.3	1.7	6.3	1.9	0.12	1.6

**Table VI Comparison of Hormonal level.**

Variable	non-PCOS (mean±SD)		PCOS (mean±SD)		p	X <sup>2</sup>
	No.	%	No.	%		
Peripheral distribution of follicles	8	26.7	30	75	0	23.7
echogenic bright ovarian stroma	12	40	25	62.5	0.02	4.8
Follicle No. > 12	10	33.3	34	85	0	22.1
volume of Ovary of more than 9 cm <sup>3</sup>	7	23.3	30	75	0	27.5

PCOS because they met the presumptive criteria for PCOS diagnosis. According to Rotterdam criteria, the prevalence of PCOS among the cases described was consequently calculated at (55%) (180). It is significantly higher than the rates of prevalence reported by recent analysis, which found, in accordance with diagnostic criteria of the Rotterdam, NIH, and AE-PCOS, whole prevalence of PCOS (with 95 percent CI) is 6 percent (5-8 percent, n = 18 trials), 10 percent (8-13 percent, n = 15 trials), and 10 percent (7 to 13 percent, n = 10), respectively.<sup>9</sup> In fact, the rates of prevalence of up to 20% in adults and up to 30% in female adolescents were documented in the literature.<sup>3</sup>

Hyperandrogenism, menstrual irregularity, & cystic ovaries are characteristics of PCOS clinical presentations. But amongst affected women, the pattern of clinical manifestation varies substantially.<sup>10</sup> Menstrual abnormalities, comprised of amenorrhea and oligomenorrhea, are most common clinical presentation in the population of study, according to the current study (44.4 percent, 15.5 percent; respectively). Menstrual abnormalities were the most common clinical manifestation (71 percent) in the PCOS group, while hyperandrogenism was found in 29% of cases. A study, who investigated adult girls having symptoms of menstrual abnormalities and the hyperandrogenism by 2 years following menarche, found results that were

similar to ours.<sup>11</sup> They used Rotterdam criteria to determine whether PCOS might be the cause. The study group is divided into 3 subgroups: those having isolated menstrual abnormalities (n = 10), those having isolated CM (cutaneous manifestation) of the hyperandrogenism (n = 6), and those having both. In the group of menstrual disorders, PCOS instances were most prevalent (70 percent). Only seven patients (or 27 percent) have met all the Rotterdam criteria using stringent criteria having a testosterone cut-off point of greater than 55 ng/dl. Similar to the previous study's analysis of 100 PCOS patients between the ages of twenty and forty years who are using metformin revealed that oligomenorrhea or amenorrhea affected 69% of the population under observation.<sup>12</sup> On the other hand, a study (14) found that the PCOS study group had greater rates of menstrual problems (89%) than the control group. Due to their research population's tight inclusion criteria and selection of PCOS individuals who exclusively visited infertility clinics, this discrepancy may be explained. Furthermore, A study who found that the 83 percent of participants having PCOS are amenorrheic/oligomenorrheic reported a greater prevalence of menstrual abnormalities.<sup>3</sup> The current results showed a significant difference in oligomenorrhea percentages between PCOS group and non-PCOS group (p=0.02). The other clinical manifestations, such as irregular periods, amenorrhea,

hirsutism, and acne, are comparable to the control, albeit ( $p > 0.05$ ). For several reasons, including variations in hormonal and anthropometrics profiles of enrolled females, the reported rates of the PCOS clinical manifestations might vary among research.<sup>13</sup> It was interesting to see that lifestyle choices had a big impact on PCOS. Fast food intake was shown to be considerably greater in the patients of PCOS compared to the patients of non-PCOS in the current investigation ( $P > 0.0001$ ). (54 percent vs 26.3 percent; respectively).

However, there is no significant difference between the 2-groups' unhealthy eating habits ( $p=0.08$ ). Given that women with the PCOS might have larger hunger and despite be more overweight eating healthier, this finding should be read cautiously.<sup>4</sup> The key conclusion was that changing one's lifestyle could dramatically improve a woman with PCOS's, BMI, weight, and FAI (free androgen index). A study looked at the relationship between dietary patterns and polycystic ovarian syndrome and found that plant-based and Western diets are linked to a higher risk of PCOS. Additionally, there was a link between the moderate adherence to the pattern of varied dietary and lower risk of the PCOS. Comparably, the study of a cross-sectional cohort study included 711 PCOS-positive women from the diverse sample that represented a range of socioeconomic statuses. There was a clear correlation between higher calorie and fat intake in the diet and hirsutism, an elevated insulin resistance and BMI.<sup>3,6</sup>

A study conducted, the PCOS group consumed considerably more chocolate (45 percent versus 17.5 percent,  $p > 0.001$ ).<sup>14</sup> The high glycemic index of chocolate, which causes a rise in BMI and worsening of insulin resistance, may be the basis for the potential link between chocolate consumption and PCOS. In fact, little research has been done on the effects of chocolate consumption in relation to PCOS. However, investigations showed contradictory data about its effect on those with PCOS. Dietary polyphenols are abundant in cocoa, which is a key component of dark chocolate. Antioxidant capabilities of polyphenols have been linked to reduced the insulin resistance.<sup>2</sup> Additionally, it is demonstrated that acute consumption of dark chocolate increased insulin sensitivity in comparison to chocolate consumption alone before intense exercise.<sup>15</sup> Therefore, it is unclear exactly how eating chocolate would affect PCOS.

The pathogenesis of PCOS may also be influenced by physical exercise. According to the current research, the

daily exercise application was lower in the group of PCOS (15 percent vs. 25 percent; where  $p = .08$ ) than in the non-PCOS group. These results should not be disregarded despite their statistical non-significance. Similar to current findings, a study that looked at 48 healthy control females without a history of PCOS and 37 participants with the condition found that young female participants with PCOS had a body composition that was similar to that of healthy controls of age-matched.<sup>16</sup> Clinical PCOS group, on the other hand, reported exercising less frequently. The statistically no significant is shown in our work does not rule out the importance of the physical activity; rather, it might be associated to lower %-ages of participants in the cohort who report engaging in regular exercise, which may be explained by the various ways that "exercise" has been defined in pertinent studies. A study's subjective questionnaire determined whether respondents should exercise or not, but our study mainly focused on females who regularly engage in aerobic activity every day.

This study found that there were substantial differences in the mean levels of LH and prolactin levels between PCOS participants and non-PCOS subjects when hormonal profiles were analysed. When compared, testosterone levels, FSH, and the DHEA-S did not show any evidence of significance ( $p=0.089$ , 0.1, and 0.13, respectively). This tendency persisted after subgroup analysis for females older or younger than 20 years, demonstrating the independence of hormonal alterations from chronological age. Similar to the present findings, A study found no significant difference statistically in the levels of FSH between healthy controls and PCOS.<sup>17</sup> In a comparable setting, A study examined outcomes of 42-control and 42-PCOS patients whose weight- and age-matched.<sup>18</sup> They discovered no significant difference in DHEA-S, FSH, & total testosterone levels between PCOS and control.

Surprisingly, the much higher prolactin levels found in the cohort of PCOS in current findings might simply be ascribed to the PCOS being incorrectly diagnosed because of its clinical similarity to hyperprolactinemia. Recent investigations that thoroughly investigated the aetiology of the hyperprolactinemia observed in PCOS have demonstrated that it can be caused by a prolactin-secreting pituitary adenoma, a variant increase in levels of prolactin, or other factors.<sup>19</sup> For instance, 227 PCOS women were the subject of a study by a study.<sup>20</sup> Prolactin levels were higher in 6 percent of the PCOS women where ( $n = 16$ ); this finding is consistently clarified by presence of the pituitary adenoma.

The current study's assessment of biochemical indicators of hyperandrogenemia revealed no statistically significant variations between the hormonal profiles of those with PCOS and those who do not have the condition in terms of levels of testosterone or the DHEA-S where the ( $p=0.1$  and  $p=0.24$ , respectively). A study, who conducted subgroup analyses in patients of various ages and duplicated similar pattern of the no significance in the subjects older or younger than twenty years, revealed similar findings.<sup>21</sup> Surprisingly, according to other findings, PCOS has much greater levels of DHEA-S and testosterone.<sup>22</sup>

Through current work, the ultrasonographic characteristics of the young adult PCOS are firmly confirmed. According to a study, who assessed the forty-five matched normo-androgenic and ovulatory women and 26 PCOS women (using the Rotterdam criteria).<sup>23</sup> All patients underwent a thorough 2D and 3D scan during the early follicular period (Days 2-Days 5). In PCOS and controls, volume of ovarian, FNPO, and the stromal volume are examined. Mean ovarian volume in PCOS and controls was 13.75.89 & 5.062.44 where ( $p < 0.0001$ ), while FNPO was 19.186.89 & 7.133.51 where ( $p > 0.0001$ ). The diagnostic thresholds for PCOS were 2D OV equal to 6.15 cm<sup>3</sup>, 2D FNPO equal to 12, and 3D OV equal to 3. OV equal to 7 cm<sup>3</sup>, FNPO equal to 10, and stromal volume equal to 6 cm<sup>3</sup> according to a 3D scan. They also noted that 2D FNPO has the greatest AUC values for PCOS diagnosis accuracy, 0.95238 and 0.93548, respectively. Additionally, a study conducted a randomised control trial with 40 women with and 40 without PCOS the condition who had BMIs that were equal ( $<25$  kg/m<sup>2</sup> and  $\geq 25$  kg/m<sup>2</sup>).<sup>23</sup> PCOS patients exhibited considerably larger ovarian volumes than healthy women ( $P = 0.01$ ) did. It's interesting to note that obese adolescent girls who are difficult to examine by using the pelvic US techniques that had elevated the ovarian volumes and the stroma in the cases of PCOS.<sup>14</sup> In the similar vein, a study indicated that average follicle quantity per ovary was a sensitive indicator of PCOS diagnosis and showed significance difference statistically when compared to the healthy controls where ( $P > 0.001$ ). It is also found to be substantially connected with the AMH.<sup>24</sup> It is important to highlight that studies that were similar to ours produced differing the mean follicle/ovary in the cases of PCOS. This could be understood in light of the fact that the most recent ultrasound technology is more sensitive and detects a greater number of follicles in general population; as a result, current application of outdated cutoff may have

overestimate prevalence of the PCOM. To elaborate the PCOM with new machines of ultrasound, a group of experts suggested using higher thresholds (i.e., 19 to 25 follicles per ovary).<sup>24</sup>

## Conclusion

Women of the reproductive age frequently experience polycystic ovarian syndrome, which has an impact on their physical, mental, and social well-being. Healthy eating and exercise are crucial lifestyle changes that can help avoid PCOS. In order to externally validate the current results, the future studies shall be planned to comprised participants from the various centres and using the more sensitive assays or the contemporary markers.

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