



## Skin Related Problems Among Women of Reproductive Age Suffering from Polycystic Ovarian

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### ABSTRACT

**Background:** Hirsutism, androgenic alopecia, acne, and seborrhea are among the skin abnormalities associated with PCOS that are brought on by hyperandrogenemia. Many women with PCOS also have dark keratosis, which is linked to insulin resistance. **Objective:** The purpose of this study is to ascertain the frequency of cutaneous symptoms linked to PCOs. **Materials and Methods:** This cross-sectional study was conducted at the People's University of Medical and Health Sciences for Women, Shaheed Benazirabad, Sindh, from August to December of 2024. One hundred PCO patients between the ages of 15 and 45 years were recruited for the study. Androgenic alopecia was evaluated using Ludwig's classification. A modified Ferriman Gallway (F-G) score was used to determine the severity of hirsutism, Acanthosis nigricans is a long-term skin disorder that affects the neck, major flexures, and acral regions and is characterized by velvety thickening and hyperpigmentation. Patients under the age of 15, those with thyroid, pituitary, hypothalamic, or adrenal disorders, and those on any hormonal, lipid-lowering, or hypoglycemic treatments were not allowed to participate in the trial. **Results:** The study's age range was 18 to 45 years old, with a mean age of  $28.81 \pm 4.83$  years. PCOS lasted an average of  $3.68 \pm 1.60$  years. According to study, hirsutism, acne, female pattern hair loss, acanthosis nigricans, seborrhea, striae, and acrochordons were found in 75.63%, 65.0%, 34.38%, 30.0%, 24.38%, 11.88%, and 11.25% of PCOS patients, respectively. **Conclusion:** Dermatological signs are part of the phenotypic profile of PCOS. In addition to being crucial in the diagnosis of PCOS, they may have long-term psychological and aesthetic effects on the patient's social and quality of life.

### INTRODUCTION

One of the most prevalent endocrine disorders affecting women is polycystic ovarian syndrome, or PCOS. Three to twelve percent of all females of reproductive age are thought to be affected. It is frequently linked to infertility and is the primary cause of menstrual problems. One of the most diverse endocrinopathies, PCOS is marked by a number of hormonal and metabolic disorders, including hyperandrogenism, insulin resistance and frequently concomitant hyperinsulinism, and abnormalities in the metabolism of fats and carbohydrates, which greatly contribute to obesity.<sup>1-3</sup>

In 1935, Stein and Leventhal published the first description of PCOS.<sup>2</sup> The National Institutes of Health held a symposium in 1990 to clarify the criteria for diagnosing PCOS, which included symptoms of androgen excess and the infrequent occurrence of ovulation. Currently, two of the three established criteria—1) the presence of clinical and/or biochemical symptoms of hyperandrogenism, 2) the absence of ovulation or its infrequent occurrence, and 3) polycystic ovaries by ultrasound—are required to

diagnose this syndrome, while ruling out other disease entities, according to the findings presented at the 2004 conference in Rotterdam.<sup>2,3</sup> Environmental, hormonal, and genetic factors all contribute to the development of PCOS. About 50% of sisters of ill women were reported to have the disease, according to the literature sources that are now available.<sup>1</sup> According to research to date, the disease's diverse nature has a significant role in how it is diagnosed and treated, and its course, frequency, and clinical picture are also influenced by ethnic variables and women's race.<sup>2-4</sup>

The target organ for androgens, which are produced locally as well as from the blood, is the skin. The process of steroidogenesis involves keratinocytes and fibroblasts, as well as skin appendages like sebaceous glands, sweat glands, and hair follicles. 5- $\alpha$ -reductase participates in this enzymatic process, which reduces testosterone to DHT and converts DHEA and androstenedione to more active metabolites. According to the research that has been done, dermis cells, hair pigment cells, hair papilla cells, and sebocytes all express more enzymes involved in the

steroidogenesis process.<sup>7</sup> This discovery demonstrates how crucial hyperandrogenism is to the emergence of androgen activity-related clinical symptoms during PCOS.<sup>8</sup> Hirsutism, androgenic alopecia, acne, and seborrhea are among the skin abnormalities associated with PCOS that are brought on by hyperandrogenemia. Many women with PCOS also have dark keratosis, which is linked to insulin resistance.<sup>9</sup>

The purpose of this study is to ascertain the frequency of cutaneous symptoms linked to PCOs. Because there isn't much local data available locally, this study will serve as a foundation for future researchers to properly understand the cutaneous changes linked to PCOs.

## METHODOLOGY

This cross-sectional study was conducted at the People's University of Medical and Health Sciences for Women, Shaheed Benazirabad, Sindh, from August to December of 2024. By WHO calculator, a sample size of 160 is calculated by assuming the frequency of acrochordons (skin tag) 9%<sup>10</sup> in patients presenting with PCOS, by taking the confidence level of 95% and precision 4.5%.

One hundred PCO patients between the ages of 15 and 45 were recruited for the study after providing written informed consent. When two of the following three criteria were met, PCOS was diagnosed using the Rotterdam consensus criteria from 2003. • Anovulation and/or oligoovulation (menstrual cycles lasting longer than 45 days); • Biochemical evidence of hyperandrogenemia and clinical manifestations of hyperandrogenism • Ultrasonography evidence of polycystic ovaries, such as an increase in ovarian volume (>10ml) and/or  $\geq 12$  follicles in each ovary with a diameter of 2 to 9 mm. Individuals with other endocrine conditions or systemic diseases (such as thyroid conditions or Cushing's syndrome) that may resemble or affect PCOS's cutaneous symptoms, use of medicines or hormonal treatments that may affect hormonal status or PCOS symptoms in the two months before to the research. Glipizide, metformin hydrochloride, atorvastatin calcium, simvastatin calcium, combination oral contraceptives, and antiandrogens are a few examples of this, women who are pregnant or nursing, as these factors can also have an impact on skin problems and hormone status and individuals who have had surgical procedures (such as ovarian drilling or laser hair removal) to treat PCOS or its symptoms were excluded.

Patients were formally recruited for a comprehensive dermatological examination after meeting the selection criteria. Every dermatological finding, including seborrheic dermatitis, androgenic alopecia, acne vulgaris, hirsutism, and others, was recorded using the predetermined operational definitions. The modified Ferriman-Gallwey scoring system was used to evaluate hirsutism across nine body areas. A cumulative score of eight or higher indicates hirsutism, with scores ranging from zero to four. Certain sorts of lesions were used to diagnose acne vulgaris, whereas patterns of hair thinning were used to diagnosis androgenic alopecia. Dark, velvety plaques were observed in body folds of Acanthosis nigricans. Participants' reports of greasiness in particular places were used to diagnose seborrheic dermatitis.

Acrochordons and striae were distinguished by their unique physical traits. To guarantee accuracy and consistency in data gathering, each condition was assessed in accordance with its predetermined operational definition. A performa was used to collect data, which included documenting dermatological history and demographic information.

The analysis of the data was done with SPSS version 26.0. The demographic features of the study population, including age, BMI, length of disease, and incidence of different dermatological symptoms, were compiled using descriptive statistics. For continuous variables (Age, BMI, and length of disease), means and standard deviations were employed, whereas frequencies and percentages were computed for categorical variables (Cutaneous symptoms).

To determine how these possible confounding factors affected PCOS dermatological manifestations, effect modifiers such as age, BMI, and length of disease were stratified and post-stratification chi-square was used. A threshold of  $p < 0.05$  was established for statistical significance.

## RESULTS

The study's age range was 18 to 45 years old, with a mean age of  $28.81 \pm 4.83$  years. As seen in Table 1, the majority of the patients—87, or 54.38%—were in the 18–30 age range.

PCOS lasted an average of  $3.68 \pm 1.60$  years (Table 2). Table 3 shows that the mean BMI was  $28.99 \pm 2.53$  kg/m<sup>2</sup>. According to Table 4, hirsutism, acne, female pattern hair loss, acanthosis nigricans, seborrhea, striae, and acrochordons were found in 75.63%, 65.0%, 34.38%, 30.0%, 24.38%, 11.88%, and 11.25% of PCOS patients, respectively.

Stratification of the various dermatological manifestations with respect to age and duration of PCOS is shown Table 5 & 6 respectively. Stratification of the various dermatological manifestations with respect to age BMI is shown in Table 7.

**Table 1**  
*Age Distribution (n=160)*

Age (in years)	No. of Patients	%age
18-30	87	54.38
31-45	73	45.62
Total	160	100.0

**Table 2**  
*Duration of PCOS (n=160)*

Duration (years)	No. of Patients	%age
$\leq 3$	77	48.13
$> 3$	83	51.87
Total	160	100.0

**Table 3**  
*BMI Distribution (n=160)*

BMI (kg/m <sup>2</sup> )	No. of Patients	%age
$\leq 30$	92	57.50
$> 30$	68	42.50
Total	160	100.0

**Table 4**  
*Skin Related Problems Among Women of Reproductive Age Suffering from Polycystic Ovarian*

Dermatological Manifestations	Frequency (%)	
	yes	no
Hirsutism	121 (75.63%)	39 (24.37%)
Acne vulgaris	104 (65.0%)	56 (35.0%)
Androgenic Alopecia	55 (34.38%)	105 (65.62%)
Acanthosis Nigricans	48 (30.0%)	112 (70.0%)
Seborrheic Dermatitis	39 (24.38%)	121 (75.62%)
Striae	19 (11.88%)	141 (88.12%)
Acrochordons	18 (11.25%)	142 (88.75%)

**Table 5**  
*Stratification of the Various Dermatological Manifestations with Respect to Age*

		18-30	31-45	P-value
		(n=87)	(n=73)	
Hirsutism	Yes	65 (74.71%)	56 (76.71%)	0.769
	No	22 (25.29%)	17 (23.29%)	
Acne vulgaris	Yes	51 (58.62%)	53 (72.60%)	0.065
	No	36 (41.38%)	20 (27.40%)	
Androgenic Alopecia	Yes	39 (44.83%)	16 (21.92%)	0.002
	No	48 (55.17%)	57 (78.08%)	
Acanthosis Nigricans	Yes	23 (26.44%)	25 (34.25%)	0.283
	No	64 (73.56%)	48 (65.75%)	
Seborrheic Dermatitis	Yes	24 (27.59%)	15 (20.55%)	0.302
	No	63 (72.41%)	58 (79.45%)	
Striae	Yes	05 (5.75%)	14 (19.18%)	0.009
	No	82 (94.25%)	59 (80.82%)	
Acrochordons	Yes	11 (12.64%)	07 (9.59%)	0.542
	No	76 (87.36%)	66 (90.41%)	

**Table 6**  
*Stratification of the Various Dermatological Manifestations with Respect to Duration*

		≤3 years	>3 years	P-value
		(n=77)	(n=83)	
Hirsutism	Yes	55 (71.43%)	66 (79.52%)	0.234
	No	22 (28.57%)	17 (20.48%)	
Acne vulgaris	Yes	42 (54.55%)	62 (64.70%)	0.007
	No	35 (45.45%)	21 (25.30%)	
Androgenic Alopecia	Yes	28 (36.36%)	27 (32.53%)	0.610
	No	49 (63.64%)	56 (67.47%)	
Acanthosis Nigricans	Yes	19 (24.68%)	29 (34.94%)	0.157
	No	58 (75.32%)	54 (65.06%)	
Seborrheic Dermatitis	Yes	22 (28.57%)	17 (20.48%)	0.234
	No	55 (71.43%)	66 (79.52%)	
Striae	Yes	13 (16.88%)	06 (7.23%)	0.059
	No	64 (83.12%)	77 (92.77%)	
Acrochordons	Yes	09 (11.69%)	09 (10.84%)	0.866
	No	68 (88.31%)	74 (89.16%)	

**Table 7**  
*Stratification of the Various Dermatological Manifestations with Respect to BMI*

		≤30 kg/m <sup>2</sup>	>30 kg/m <sup>2</sup>	P-value
		(n=92)	(n=68)	
Hirsutism	Yes	67 (72.83%)	54 (79.41%)	0.338
	No	25 (27.17%)	14 (20.59%)	
Acne vulgaris	Yes	53 (57.61%)	51 (75.0%)	0.022
	No	39 (42.39%)	17 (25.0%)	
Androgenic Alopecia	Yes	34 (36.96%)	21 (30.88%)	0.424
	No	58 (63.04%)	47 (69.12%)	
Acanthosis Nigricans	Yes	37 (40.22%)	11 (16.18%)	0.001
	No	55 (59.78%)	57 (83.82%)	
Seborrheic Dermatitis	Yes	27 (29.35%)	12 (17.65%)	0.088
	No	65 (70.65%)	56 (82.35%)	
Striae	Yes	10 (10.87%)	09 (13.24%)	0.648
	No	82 (89.13%)	59 (86.76%)	
Acrochordons	Yes	09 (9.78%)	09 (13.24%)	0.494
	No	83 (90.22%)	59 (86.76%)	

## DISCUSSION

In our research, 72% of women had hirsutism.<sup>11</sup> PCOS is the leading cause of hirsutism in women.<sup>12</sup> Over 80% of physicians utilize this criterion to diagnose PCOS, and over 40% believe that HA is one of the key pillars for PCOS diagnosis. HA symptoms include hirsutism, acne vulgaris, and alopecia. These patients had mild, moderate, and severe hirsutism in 63.8%, 30.5%, and 5.7% of cases, respectively. The prevalence of hirsutism is between 4 and 11% in the general population, but it is between 65 and 75% in patients with PCOS.<sup>13,14</sup> Chhabra S. et al. found that 70% of hirsutism patients had PCOS,<sup>15</sup> which is in line with our results. In their study, Bliede K et al. found that 84% of PCOS patients had hirsutism.

Since the face has more sebaceous gland activity than other parts of the skin, acne usually begins there. Although 50% of hyperandrogenic women have acne on their neck, chest, and upper back, it is 1.6 times more common in PCOS patients than in the general population.<sup>16</sup> In our study, 54% of participants had acne. The proportion of patients with moderate acne was 29.6%, whereas 51.8% had mild acne. Our results are consistent with a comprehensive review and meta-analysis of 60 articles encompassing 240,213 PCOS patients by Ramezani Tehrani F et al., who found that the prevalence of acne ranged from 43% to 59%.<sup>16</sup> Chanyachailert P et al.<sup>17</sup> found that PCOS was present in 48.3% of acne cases. In line with our findings, other researchers have found that 57% of PCOS patients have acne.<sup>18</sup> Jain et al. also found that acne was present in 59.5% of PCOS cases.<sup>19</sup> Our results are in line with Singh et al.'s findings that 64.3% of PCOS patients had mild to moderate acne.<sup>20</sup>

Acanthosis nigricans (AN) is thought to be the dermatological manifestation of insulin resistance, and PCOS is linked to both AN and insulin resistance.<sup>21</sup> In this study, AN was present in 42% of the study population, or more than one-third. The prevalence rates of Singh et al. (47.1%) and Jain et al. (35.3%) are comparable to this.<sup>19,20</sup> Our findings are in line with those of other studies that found that nearly one-third of PCOS patients have AN.<sup>22</sup> Charnvises K et al. found that 39.7% of PCOS patients had AN, which is in line with our findings.<sup>23</sup> Androgenic alopecia (AGA) is thought to be the hyperandrogenic manifestation of PCOS. Compared to the prevalence of AGA (20%) in our study, the prevalence in previous literature ranged from 31% to 34% in patients with PCOS.<sup>24,25</sup> Quinn, M. et al., however, came to similar conclusions.<sup>26</sup>

According to a different study<sup>128</sup>, hirsutism accounted for 85% of the cutaneous signs of PCOS, with acne (73%), seborrhea (50%), AGA (36%), acanthosis nigricans (29%), and acrochordons (9%), following in order of prevalence. Insulin resistance was the most prevalent hormonal anomaly, occurring in 53% of patients. This was followed by elevated free testosterone in 19% of patients and serum prolactin in 18% of patients. Insulin resistance, hirsutism and elevated prolactin levels, seborrhea, and elevated body mass index were all statistically significantly correlated with AGA ( $p < 0.05$ ).<sup>27</sup>

Gowri et al. evaluated the prevalence and incidence of cutaneous complaints in forty PCOS patients.<sup>28</sup> Hirsutism (52.5%), seborrhea (52.5%), androgenic alopecia (AGA)

(30%), acanthosis nigricans (22.5%), and acrochordons (10%) were following closely behind acne, which made up 67.5% of all cutaneous symptoms in their study. In our study group of women with PCOS, the prevalence of hirsutism was 75.63%. According to certain research, between 50 and 76 percent of women with PCOS have hirsutism.<sup>29,30</sup> According to Saxena et al.'s research, hirsutism was 89% and 80% common in PCOS patients who were fat and those who were slender.<sup>31</sup>

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## CONCLUSION

Dermatological signs are part of the phenotypic profile of PCOS. In addition to being crucial in the diagnosis of PCOS, they may have long-term psychological and aesthetic effects on the patient's social and quality of life. Patients should receive information on lifestyle modifications, long-term management alternatives, and their prognosis.

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