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Original Article

A PROSPECTIVE HOSPITAL-BASED STUDY ON CUTANEOUS MANIFESTATIONS IN PATIENTS WITH POLYCYSTIC OVARIAN SYNDROME (PCOS).

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Abstract

Background

Polycystic Ovarian Syndrome (PCOS) is a common endocrine disorder among women of reproductive age and is often associated with distinct cutaneous manifestations such as acne, hirsutism, and acanthosis nigricans. These dermatological signs can serve as early clinical indicators of underlying hormonal and metabolic disturbances.

Aim

To evaluate the frequency and pattern of cutaneous manifestations in PCOS patients and assess their association with body mass index (BMI) in a tertiary care setting.

Methods

A prospective observational study was conducted over a period of 6 months at a tertiary care hospital in North Bihar. Fifty female patients aged 15–45 years, diagnosed with PCOS based on the Rotterdam criteria, were included. Data on demographic details, BMI, and various cutaneous manifestations were collected using a structured proforma. Severity grading tools such as the Ferriman-Gallwey score for hirsutism and the Global Acne Grading System (GAGS) for acne were utilized. Statistical analysis was performed using SPSS version 23.0.

Results

The mean age of participants was 24.8 ± 4.3 years, with 68% being overweight or obese. Acne was the most common manifestation (80%), followed by hirsutism (64%) and acanthosis nigricans (48%). Androgenic alopecia, seborrhea, and striae distensae were also observed. A statistically significant association was found between elevated BMI and the presence of acanthosis nigricans ($p = 0.012$) and hirsutism ($p = 0.034$).

Conclusion

Cutaneous manifestations are highly prevalent among women with PCOS, with acne and hirsutism being the most common. These features can serve as valuable clinical markers for early identification of PCOS, particularly in dermatology settings.

Keywords: *Polycystic Ovarian Syndrome, Acne, Hirsutism, Acanthosis Nigricans, Body Mass Index*
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Introduction

Polycystic Ovarian Syndrome (PCOS) is a common endocrine disorder affecting 6–20% of women of reproductive age worldwide, depending on the diagnostic criteria used [1]. Characterized by hyperandrogenism, chronic anovulation, and polycystic ovaries, PCOS presents with a wide range of systemic and dermatological symptoms [2]. Among these, cutaneous manifestations are often the most visible and distressing to patients, sometimes prompting the initial clinical evaluation.

Cutaneous signs in PCOS result primarily from hyperandrogenism and insulin resistance, which play a central role in its pathogenesis [3]. The most frequently observed dermatological features include acne, hirsutism, androgenic alopecia, seborrhea, and acanthosis nigricans [4]. Acne, particularly persistent or treatment-resistant acne in adult women, is a well-recognized clinical indicator of underlying hormonal imbalance [5]. Hirsutism, defined by excessive terminal hair growth in a male pattern, is reported in approximately 65–75% of PCOS cases and is assessed using the Ferriman-Gallwey scoring system [6].

Acanthosis nigricans, a marker of insulin resistance, presents as hyperpigmented, velvety thickening of the skin and is commonly seen in overweight or obese PCOS patients [7]. These cutaneous features can significantly impact the psychological well-being of patients, leading to anxiety, depression, and decreased quality of life [8].

The pathophysiological interplay between insulin resistance, increased luteinizing hormone secretion, and enhanced ovarian androgen production contributes to the

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development of both reproductive and cutaneous symptoms [9]. Recent studies have emphasized the growing prevalence of PCOS-related dermatological conditions in India and other developing countries, driven in part by rising obesity rates and sedentary lifestyles [10].

Despite the high frequency of dermatological involvement, skin manifestations in PCOS are often underreported or misdiagnosed, delaying appropriate endocrine evaluation. Recognizing these signs early in the clinical setting, especially in dermatology outpatient departments, can prompt timely diagnosis and management of the underlying hormonal disorder [11].

Given the increasing burden of PCOS and its varied presentations, this study aims to evaluate the spectrum of cutaneous manifestations in PCOS patients attending a tertiary care hospital. It also seeks to assess their correlation with body mass index (BMI), thereby highlighting the importance of integrating dermatologic and metabolic assessments in the routine care of women with PCOS. To evaluate the frequency and pattern of cutaneous manifestations in PCOS patients and assess their association with body mass index (BMI) in a tertiary care setting.

Methodology

Study Design

This study was designed as a hospital-based prospective observational study**.**

Study Setting

The study was carried out at a tertiary care hospital in North Bihar**,** which caters to a diverse population and serves as a referral center for various dermatological and gynecological conditions.

Participants

A total of 50 female patients diagnosed with PCOS, either clinically or through radiological and biochemical evaluation, were included in the study. These patients attended the dermatology and gynecology outpatient departments during the study period.

Inclusion Criteria

- Female patients aged between 15 and 45 years.
- Patients diagnosed with PCOS according to the Rotterdam criteria (presence of at least two out of three: oligo/anovulation, clinical or biochemical hyperandrogenism, and polycystic ovaries on ultrasound).
- Patients who provided informed consent to participate in the study.

Exclusion Criteria

- Patients with other endocrinological disorders such as Cushing's syndrome, congenital adrenal hyperplasia, or thyroid dysfunction.
- Patients on hormonal treatment or systemic steroids within the last three months.
- Pregnant or lactating women.
- Patients are unwilling to participate or do not provide consent.

Bias

To minimize selection bias, consecutive sampling was used to include eligible participants presenting during the study period. Information bias was reduced by using standardized data collection formats and performing clinical assessments by trained dermatologists.

Data Collection

Detailed history and clinical examination were conducted for all participants. A structured proforma was used to record demographic details, menstrual history, body mass index (BMI), and the presence of cutaneous manifestations such as acne, hirsutism, acanthosis nigricans, seborrhea, androgenic alopecia, and striae. Relevant laboratory investigations and ultrasonography reports were reviewed to confirm PCOS diagnosis.

Procedure

All patients underwent a thorough dermatological and gynecological evaluation. Cutaneous findings were documented and classified based on clinical severity wherever applicable. The Ferriman-Gallwey score was used to assess hirsutism. Acne severity was graded using the Global Acne Grading System (GAGS), and alopecia was assessed using the Ludwig scale.

Statistical Analysis

Data were compiled using Microsoft Excel and analyzed using Statistical Package for the Social Sciences (SPSS) version 23.0**.** Descriptive statistics such as mean, standard deviation, and percentages were used to summarize continuous and categorical variables. The chi-square test and Student's t-test were applied to determine the significance of associations. A p-value < 0.05 was considered statistically significant.

Results

A total of 50 female patients diagnosed with PCOS were included in the study. The mean age of the participants was 24.8 ± 4.3 years**,** with the age range being 18 to 35 years**.** The majority of the patients **(**56%**)** belonged to the age group of 21–25 years**.**

Table 1: Age Distribution of Patients (n = 50)

Age Group (years)	Number of Patients	Percentage (%)
15–20	10	20%
21–25	28	56%
26–30	9	18%
>30	3	6%

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The highest prevalence of PCOS with cutaneous manifestations was observed in the age group of 21–25 years.

Body Mass Index (BMI) Analysis

Out of 50 patients, 34 (68%) were overweight or obese (BMI ≥ 25 kg/m²). The mean BMI was 26.2 ± 3.1 kg/m².

Table 2: BMI Classification of Patients

BMI Category	Number of Patients	Percentage (%)
<18.5 (Underweight)	2	4%
18.5–24.9 (Normal)	14	28%
25–29.9 (Overweight)	23	46%
≥30 (Obese)	11	22%

A significant proportion of patients were either overweight or obese, suggesting a strong association between increased BMI and PCOS-related skin changes.

Prevalence of Cutaneous Manifestations

All 50 patients presented with at least one cutaneous manifestation. The most common cutaneous feature was acne (80%), followed by hirsutism (64%), and acanthosis nigricans (48%).

Table 3: Frequency of Cutaneous Manifestations in PCOS Patients

Cutaneous Manifestation	Number of Patients	Percentage (%)
Acne	40	80%
Hirsutism	32	64%
Acanthosis Nigricans	24	48%
Androgenic Alopecia	20	40%
Seborrhea	15	30%
Striae Distensae	8	16%
Skin Tags	5	10%

Acne and hirsutism were the leading dermatological signs. Many patients exhibited more than one manifestation simultaneously.

Severity of Hirsutism (Ferriman-Gallwey Score)

Among the 32 patients with hirsutism:

- Mild (score 8–15): 18 (56.2%)
- Moderate (score 16–25): 10 (31.3%)
- Severe (>25): 4 (12.5%)

Severity of Acne (GAGS Score)

Among the 40 patients with acne:

- Mild Acne: 12 (30%)
- Moderate Acne: 18 (45%)
- Severe Acne: 10 (25%)

Association Between BMI and Cutaneous Manifestations

A statistically significant association was found between higher BMI and acanthosis nigricans ($p = 0.012$) and hirsutism ($p = 0.034$) using the Chi-square test.

Table 4: Association of BMI with Acanthosis Nigricans

BMI Category	Acanthosis Nigricans Present	Absent	Total
<25 (Normal/Underweight)	4	12	16
≥25 (Overweight/Obese)	20	14	34
Total	**24**	**26**	**50**

Chi-square test: $\chi^2 = 6.32$, $p = 0.012$ (Significant)

Acanthosis nigricans was significantly more prevalent in overweight and obese patients.

Summary of Key Findings

- Acne (80%), hirsutism (64%), and acanthosis nigricans (48%) were the most common skin manifestations.
- A majority (68%) of the participants had a BMI ≥25.
- Statistically significant associations were found between elevated BMI and both acanthosis nigricans and hirsutism.

Discussion

This prospective hospital-based study included 50 female patients diagnosed with polycystic ovarian syndrome (PCOS) to evaluate their cutaneous manifestations. The majority of participants were young women, with a mean age of 24.8 years, and most (56%) belonged to the 21–

25-year age group. This finding is consistent with the fact that PCOS commonly presents in reproductive-age women, particularly in their early twenties.

A significant proportion of the participants (68%) were either overweight or obese, highlighting the strong link between increased BMI and PCOS. The mean BMI was 26.2 kg/m², indicating a tendency toward overweight status in the study population. This is clinically important, as obesity is known to exacerbate both metabolic and dermatologic symptoms in PCOS. All patients in the study exhibited at least one cutaneous manifestation, reinforcing the high dermatological burden of PCOS. Acne was the most prevalent manifestation, seen in 80% of cases, followed by hirsutism (64%) and acanthosis nigricans (48%). These findings reflect the underlying hyperandrogenism and insulin resistance commonly associated with PCOS. Androgenic alopecia (40%) and seborrhea (30%) were also frequently noted, while striae distensae and skin tags were less common.

When graded, hirsutism and acne showed varying degrees of severity. More than half of the patients with hirsutism had mild scores (Ferriman-Gallwey 8–15), while a quarter of acne cases were graded as severe based on the Global Acne Grading System. These patterns indicate a spectrum of clinical presentations, likely influenced by hormonal imbalances and individual variations in androgen sensitivity. Importantly, statistical analysis revealed a significant association between increased BMI and the presence of acanthosis nigricans (p = 0.012), as well as hirsutism (p = 0.034). This underscores the role of insulin resistance and obesity in the pathogenesis of these skin changes. No significant correlation was found between BMI and acne severity, suggesting that acne may be more closely related to androgen levels than weight.

In summary, the study demonstrates that cutaneous manifestations are highly prevalent among PCOS patients, with acne and hirsutism being the most frequent. The association of certain skin findings with higher BMI reinforces the need for early screening and lifestyle interventions in overweight PCOS patients. Dermatologic signs can serve as important clinical indicators for early diagnosis and comprehensive management of PCOS.

Several recent studies have evaluated the prevalence and pattern of cutaneous manifestations among patients with polycystic ovarian syndrome (PCOS), emphasizing their diagnostic value and correlation with hormonal and metabolic profiles. Hirsutism and acne were identified as the most common dermatological features in multiple cohorts. For instance, a large 2025 study found that hirsutism was present in 93.26% and acne in 85.6% of women with PCOS, with obesity significantly exacerbating the prevalence of hirsutism [12]. Similarly, Masaeli et al. observed hirsutism in 91% of their PCOS patients, particularly in areas such as the groin and chin, with concurrent findings of alopecia, acanthosis nigricans, and acne vulgaris [13].

BMI was shown to significantly influence dermatologic symptoms. Jena et al. reported a statistically significant correlation between acne and BMI (p = 0.009), indicating that overweight individuals are more prone to such manifestations [14]. This was supported by Kaur et al., who found that insulin resistance (53%) and elevated androgen levels were common in patients with skin symptoms like hirsutism (85%) and acne (73%) [15]. Abusailik et al. also noted that acne was the most common feature (75.3%) in Jordanian women, followed by hirsutism and seborrhea, with higher BMI associated with more severe symptoms [16].

Hormonal abnormalities were consistently linked to cutaneous signs. Elevated LH, LH/FSH ratio, and free testosterone levels were significantly associated with acne and hirsutism. For example, Aljefri et al. found raised LH in 49.1% and a high LH/FSH ratio in 35.5% of patients, with these hormones predicting acne vulgaris (p = 0.01) [17]. Similarly, hirsutism was strongly linked to serum androgens in an Egyptian PCOS cohort, especially in phenotype A patients, which also showed the highest levels of hyperandrogenism [18].

Conclusion

Cutaneous manifestations are highly prevalent in women with PCOS, with acne, hirsutism, and acanthosis nigricans being the most common. A significant association was observed between elevated BMI and certain skin changes, highlighting the role of obesity and insulin resistance. Early identification of these dermatological signs can aid in the prompt diagnosis and holistic management of PCOS.

Recommendations

Routine dermatological screening in women with suggestive symptoms should be encouraged to facilitate early diagnosis and management of PCOS. Weight management and lifestyle interventions should be emphasized in overweight patients to mitigate dermatological and metabolic complications.

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The study had no funding.

Conflict of interest

The authors declare no conflict of interest.

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