Section: Dermatology

Original Research Article

CUTANEOUS MANIFESTATIONS OF POLYCYSTIC OVARY SYNDROME: A CROSS-SECTIONAL CLINICAL STUDY

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ABSTRACT

Background: Polycystic Ovary Syndrome (PCOS) is a common endocrine disorder characterized by a constellation of reproductive, metabolic, and dermatologic abnormalities. The objective is to assess the prevalence and patterns of cutaneous manifestations in women diagnosed with PCOS and to examine their association with metabolic and reproductive parameters

Materials and Methods: This descriptive cross-sectional study was conducted at Military Hospital Jodhpur Rajasthan India during 1st Jan 2022 to 31 Dec 2024. A total of 100 female patients, aged between 15 and 40 years, diagnosed with PCOS based on the Rotterdam criteria (requiring two out of three features: oligo/anovulation, hyperandrogenism, and polycystic ovaries on ultrasound) were included in the study.

Results: The mean age of participants was 26.8 ± 5.4 years, with 71% having a BMI ≥ 25 kg/m². Hirsutism was the most prevalent cutaneous feature (74%), followed by acne (61%), androgenic alopecia (48%), seborrhea (40%), acanthosis nigricans (36%), and skin tags (22%). Acanthosis nigricans was significantly more common in overweight and obese patients (43.7% vs. 17.2%, p = 0.01). Hirsutism was significantly associated with menstrual irregularities (80.5% vs. 44.4%, p = 0.01). The majority of acne cases were of mild to moderate severity, while a smaller proportion (23%) had severe acne.

Conclusion: It is concluded that cutaneous manifestations are highly prevalent among PCOS patients and are closely associated with both hormonal and metabolic disturbances. Dermatologic findings such as hirsutism, acne, and acanthosis nigricans can serve as useful clinical markers for early identification and management of PCOS.

Keywords: Cutaneous Manifestations, Polycystic Ovary Syndrome, Hirsutism.

INTRODUCTION

Polycystic Ovary Syndrome (PCOS) is a complex endocrine disorder with a broad spectrum of clinical presentations and systemic implications. Scientists have established that PCOS functions as one of the main reasons which leads to persistent anovulation and excess male hormone production in females who are capable of childbearing.[1] Different diagnostic approaches establish the PCOS frequency at between 6% and 20% of affected women according to the National Institutes of Health (NIH), Rotterdam, or Androgen Excess and PCOS Society (AES) standards.[2] The dermatological characteristics of PCOS emerge early as actual clinical indicators while reproductive and metabolic issues represent its main medical features. Excess circulating androgens and insulin-resistant conditions in PCOS lead to the development of cutaneous symptoms. Excessive hormone activity triggers both sebaceous glands and hair follicles to become active leading to hirsutism and acne alongside androgenic alopecia and seborrhea manifestations.[3] Hirsutism affects 70–80% of women with PCOS and means they develop excessive terminal hair in a male pattern distribution. This condition appears frequently in diagnosing PCOS. The acne vulgaris which

develops in PCOS tends to stay persistent while being both inflammatory and showing resistance to standard therapies specifically among adult women. Female pattern hair loss or androgenic alopecia constitutes a psychologically difficult condition that requires early intervention due to its stubborn management challenges.[4]

Cutaneous changes occur in patients with PCOS through insulin resistance because this metabolic condition affects up to 50–70% of patients by altering both keratinocyte proliferation and melanocyte activity.[5] Acanthosis nigricans develops due to these changes which produces dark velvety skin lesions which primarily appear on the neck and under the arms and around the groin area.Acrochordons otherwise known as skin tags commonly appear in patients with PCOS and function as visual indicators of insulin resistance and metabolic syndrome.[6] The dermatologic manifestations of PCOS lead to severe mental impact apart from visible physical changes. Low quality of life presents itself among patients since their symptoms create cosmetic and stigmatizing challenges.[7] Women with PCOS demonstrate elevated rates of depression and anxiety together with low self-esteem and social withdrawal particularly when they experience conditions such as facial hirsutism or cystic acne. We need a caring approach which addresses the complete wellness needs of such patients because of their heavy mental responsibility.[8]

Cutaneous manifestations enable clinicians to identify women who need additional endocrine testing through a simple examination method that also proves economical. When patients display acne together with irregular hair growth dermatologists are the primary healthcare providers to assess the condition first.[9] Early diagnosis of PCOS along with suitable treatment needs the combined understanding of dermatologists and physician teams with gynecologists regarding these skin problems. Care for PCOS cutaneous manifestations involves several treatment aspects including hormone control combined with life-style adjustments and dermatological interventions.[10] Medical management for PCOS relies on combined oral contraceptives with anti-androgens and insulin sensitizers together with topical medications. The healthcare provider may decide to use procedural dermatologic procedures such as laser hair removal and chemical peels and photodynamic therapy when seeking patient outcome enhancement and improved self-image.[11]

Objective: To assess the prevalence and patterns of cutaneous manifestations in women diagnosed with PCOS and to examine their association with metabolic and reproductive parameters.

MATERIALS AND METHODS

This descriptive cross-sectional study was conducted at Military Hospital Jodhpur Rajasthan India during 1st Jan 2022 to 31 Dec 2024. A total of 100 female patients, aged between 15 and 40 years, diagnosed with PCOS based on the Rotterdam criteria (requiring two out of three features: oligo/anovulation, hyperandrogenism, and polycystic ovaries on ultrasound) were included in the study.

Inclusion Criteria

- Females aged 15–40 years
- Confirmed diagnosis of PCOS according to Rotterdam criteria
- Willing to participate and provide informed consent

Exclusion Criteria

- Patients with other endocrinopathies (e.g., congenital adrenal hyperplasia, Cushing's syndrome, thyroid disorders)
- Patients on hormonal therapy for any other condition
- Pregnant or lactating women
- Patients with known dermatologic disorders unrelated to PCOS

Data Collection: After obtaining informed consent, demographic data, clinical history, and detailed dermatologic examination findings were recorded using a structured proforma. A thorough skin examination was performed by a dermatologist to identify cutaneous signs including hirsutism (scored using the modified Ferriman-Gallwey score), acne (graded by severity), androgenic alopecia (classified using Ludwig's scale), seborrhea, acanthosis nigricans, and skin tags.

Statistical Analysis: Data were entered and analyzed using SPSS v26. Categorical variables were presented as frequencies and percentages, while continuous variables were expressed as means ± standard deviations. The association between cutaneous findings and clinical parameters (e.g., BMI, duration of PCOS, menstrual irregularities) was analyzed using chi-square test or independent t-test, with a p-value <0.05 considered statistically significant.

RESULTS

A total of 100 patients were added in the study, with a mean age of 26.8 ± 5.4 years, with participants ranging from 17 to 38 years. The mean BMI was 28.4 ± 3.9 kg/m², and a majority (71%) were classified as overweight or obese (BMI ≥ 25 kg/m²). Menstrual irregularities were reported by 82% of the participants, indicating a strong reproductive component in the cohort. Additionally, 59% of the women were married, while 38% were nulliparous at the time of the study.

Among the 100 PCOS patients studied, hirsutism was the most frequently observed cutaneous

manifestation, present in 74% of individuals. Acne was reported in 61% of patients, followed by androgenic alopecia in 48%, seborrhea in 40%, acanthosis nigricans in 36%, and skin tags in 22%. Regarding the severity of hirsutism, 58.1% of affected individuals had mild scores, 33.8% had moderate scores, and 8.1% had severe scores based on the Modified Ferriman-Gallwey scale. In terms of acne severity, 42.6% had mild acne, 34.4% had moderate acne, and 23% had severe acne, indicating a diverse clinical presentation across the study population.

Table 1: Demographic and Baseline Characteristics of Study Participants (n = 100).

Variable	Value
Mean age (years)	26.8 ± 5.4
Age range (years)	17–38
BMI (mean ± SD)	28.4 ± 3.9
BMI ≥ 25 kg/m²	71 (71.0%)
Menstrual irregularities	82 (82.0%)
Married	59 (59.0%)
Nulliparous	38 (38.0%)

Table 2: Frequency of Cutaneous Manifestations in Patients with PCOS (n = 100).

Cutaneous Manifestation	Frequency (n)	Percentage (%)
Hirsutism	74	74.0
Acne	61	61.0
Androgenic alopecia	48	48.0
Seborrhea	40	40.0
Acanthosis nigricans	36	36.0
Skin tags	22	22.0
Severity (Modified Ferriman-Gallwey Score)		
Mild (8–15)	43	58.1
Moderate (16–25)	25	33.8
Severe (>25)	6	8.1
Severity of acne		
Mild	26	42.6
Moderate	21	34.4
Severe	14	23.0

Acanthosis nigricans was significantly more prevalent among patients with a BMI of 25 or higher, observed in 43.7% of the overweight or obese group. In contrast, only 17.2% of patients with a normal BMI showed signs of acanthosis nigricans.

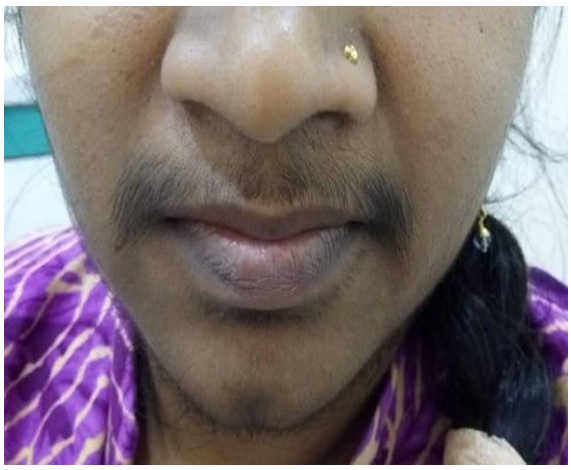
Table 3: Association of Acanthosis Nigricans with BMI (n = 100)

BMI Category	Acanthosis Nigricans Present (n)	Total Patients (n)	Percentage (%)	p-value
Overweight/Obese (≥25)	31	71	43.7	0.01
Normal (<25)	5	29	17.2	0.01

Hirsutism was more commonly observed in patients with irregular menstrual cycles, with 80.5% of this group affected. In contrast, only 44.4% of those with regular cycles exhibited hirsutism. This difference was statistically significant ($p = 0.01$), indicating a strong association between menstrual irregularities and the presence of hirsutism in women with PCOS.

Table 4: Association Between Menstrual Irregularities and Hirsutism (n = 100)

Menstrual Pattern	Hirsutism Present (n)	Total Patients (n)	Percentage (%)	p-value
Irregular	66	82	80.5	0.01
Regular	8	18	44.4	0.01



Photograph 1: Hirsutism

Photograph 2: Acne tarda

DISCUSSION

This study highlights the high prevalence and clinical spectrum of cutaneous manifestations among women with PCOS, reinforcing the pivotal role of dermatologic findings in early diagnosis and comprehensive disease management. Among the 100 patients assessed, the most frequently observed skin condition was hirsutism (74%), followed by acne (61%), androgenic alopecia (48%), seborrhea (40%), acanthosis nigricans (36%), and skin tags (22%). These findings are consistent with earlier studies, which have similarly reported hirsutism as the most common dermatologic manifestation in PCOS, often attributed to elevated androgen levels and hypersensitivity of hair follicles to circulating hormones.[12] The prevalence of acne (61%) in our cohort aligns with studies by Yildiz et al. and Carmina et al., who noted that acne in PCOS tends to be more persistent, resistant to treatment, and may continue beyond adolescence. Our results also indicate that nearly one-fourth of these patients had severe acne, underscoring the psychosocial impact and therapeutic challenge posed by androgen-driven dermatologic conditions.[13-15] A significant proportion of women (48%) had androgenic alopecia, reflecting the chronicity of hyperandrogenic exposure and follicular miniaturization. While often underdiagnosed due to cultural factors or overlapping etiologies, female-pattern hair loss in PCOS has been linked with both hormonal and metabolic factors, including insulin resistance, which was also evident in our population through the frequency of acanthosis nigricans.[16] Acanthosis nigricans was observed in 36% of participants and was significantly more common among overweight and obese individuals (43.7% vs. 17.2%, $p = 0.01$). This is consistent with the established pathophysiological link between insulin resistance and keratinocyte proliferation, and further supports the use of dermatologic findings as clinical indicators for underlying metabolic disturbances.[17] Previous studies have similarly reported acanthosis nigricans as a reliable marker for insulin resistance and increased cardiovascular risk in PCOS. Our study also found a significant association between menstrual irregularities and the presence of hirsutism (80.5% in those with irregular cycles vs. 44.4% in regular cycles; $p = 0.01$), reaffirming the correlation between reproductive and dermatologic hyperandrogenic features.[18] This interrelationship highlights the need for an integrated diagnostic approach where menstrual history, metabolic evaluation, and cutaneous examination are not considered in isolation but as overlapping domains of the same syndrome.[19,20] The relatively high rates of obesity (71%) and menstrual irregularities (82%) further emphasize the systemic nature of PCOS and its tendency to co-occur with dermatologic, metabolic, and reproductive dysfunctions. These data support the need for routine dermatologic screening in women presenting with any features suggestive of PCOS, especially in resource-limited settings where hormonal assays and imaging may not be readily available.

CONCLUSION

It is concluded that cutaneous manifestations are highly prevalent in patients with Polycystic Ovary Syndrome and serve as important clinical indicators of underlying endocrine and metabolic dysfunctions. Hirsutism, acne, and androgenic alopecia were the most frequently observed features, often presenting alongside signs of insulin resistance such as acanthosis nigricans and skin tags. The strong association of these skin conditions with menstrual irregularities and elevated BMI further reinforces the interconnected nature of hormonal and metabolic pathways in PCOS. Early recognition of these dermatologic signs can facilitate timely diagnosis, prompt initiation of treatment, and prevention of long-term complications including infertility, metabolic syndrome, and cardiovascular disease.

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