

Prevalence and clinical profile of Polycystic ovary syndrome (PCOS) in acne patients – A hospital based cross-sectional study

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Abstract

Background: Acne is a common manifestation of hyperandrogenemia, commonly encountered in females associated with Polycystic Ovarian Syndrome (PCOS).

Aims and Objectives: To determine the prevalence and clinical profile of Polycystic Ovarian Syndrome (PCOS) in acne patients.

Methods: This cross-sectional hospital-based, observational study compared the clinical profile of acne patients with PCOS and without PCOS. 150 patients of acne were recruited to diagnose underlying PCOS and clinical signs were looked for in PCOS and non PCOS group. They were studied for age, weight, height, body mass index (BMI), menstrual history as well as androgenic signs like hirsutism and acanthosis nigricans.

Results: PCOS was diagnosed in 66 patients (44%) out of 150 patients of acne. Premenstrual flare was observed in 44 cases (68.18% cases of PCOS and 31.82% in non-PCOS). This result were statistically significant (P value 0.000). Mean BMI in PCOS and non PCOS group was 21.68 ± 4.40 and 20.51 ± 2.73 respectively. The severity of acne in PCOS group was mild, moderate and severe in 51.5%, 24.24% and 24.26% cases respectively. Hirsutism was observed in 51 cases of which 36 (70.59%) belonged to PCOS group (P value= 0.000).

Conclusion: PCOS is a common disorder in acne patients. It is significantly associated with duration and severity of acne. BMI, premenstrual flare, and hirsutism are significantly associated with PCOS group as compared to non-PCOS group. In resource poor settings, clinical signs can prove to be strong predictor of this syndrome.

Keywords: Polycystic Ovary Syndrome, hyperandrogenemia, acne

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I. Introduction

Acne vulgaris is a disorder of pilosebaceous unit characterized by the formation of comedones, papules, pustules, nodules and cysts. It is the most common disorder encountered by dermatologists.¹ The precise mechanisms of acne are not known but there are four major pathogenic factors;² increased sebum production, hypercornification of pilosebaceous duct, abnormal bacterial function and production of inflammation. One of the important etiologic factor in acne is an increase in the sebaceous gland activity, which is androgen dependent. Acne is a common manifestation of hyperandrogenemia.³ Therefore, acne may not only cause cosmetic concern but may also be a sign of underlying disease. In females, the most common cause of hyperandrogenemia is polycystic ovary syndrome (PCOS).

PCOS is a heterogeneous condition which is defined by the presence of two out of the three diagnostic criteria: oligo and/or amenorrhoea, hyperandrogenism (clinical and/or biochemical), polycystic ovaries.⁴ Pathogenesis of PCOS is unknown, however it is a complex multigenetic disorder characterized by abnormal gonadotropin release and dysregulation of steroidogenesis.⁴ PCOS is the most common endocrine disorder among women during their reproductive period. The prevalence of PCOS in fertile women is estimated to be between 5-10%^{5,6} but the prevalence rates reported are naturally dependent on the exact definition used⁷ and on the ethnicity⁸ of the studied population. Seirafi *et al.* showed that the prevalence of PCOS in women with acne was about 40%.⁹ Walton *et al.* reported that in 5.5% of the acne cases, PCO could be observed.¹⁰ Soodabeh Zandi *et al.* in a cross sectional study of 118 female acne patients, reported PCOS in 57 (48.3%) patients by ultrasonography, while, 71 (60.2%) patients were diagnosed as PCOS based on the NIH criteria.¹¹

II. Method

This cross-sectional hospital-based, observational study was carried out to determine the prevalence of PCOS in acne patients attending out-patient Department of Dermatology, Venereology and Leprosy. The study compared the clinical profile of acne patients with PCOS and without PCOS. A total of 150 female patients with acne aged between 15-45 years were enrolled for the purpose of study. A purposive sampling method was used considering inclusion and exclusion criteria. The female patients with acne, aged 15-45 years were consented to participate in the study and undergo pelvic USG and blood tests were included in the study. Female patients with acne who had already received hormonal treatment, including hormonal contraceptives and antiandrogen therapy, and at the time of study were pregnant and lactating mothers, and on drugs for acne any kind of anti-acne treatment in last one month prior to the study were excluded from the study.

A proforma was used to record detailed demographic data along with clinic history such as age of onset of acne, duration of present episode of acne, premenstrual flare, menstrual history regarding menarche, length of cycle, days of bleeding and date of last menstrual period.

The patients were considered to have PCOS if any 2 out of 3 criteria were met (Rotterdam criteria):¹²

1. Oligomenorrhoea (menstrual cycle of >35 days) and /or amenorrhoea (absence of menstruation for at least 6 months)
2. Excess androgen activity (Biochemical or Clinical)
 1. Biochemical parameter: Increased level of serum testosterone and /or increased level of serum dehydroepiandrosteronesulphate (DHEAS).
 2. Clinical parameter: Presence of acne and /or hirsutism
3. Polycystic ovaries (in pelvic ultrasound): 12 or more follicles in either ovary (2-9 mm in diameter) & or at least one enlarged ovary of > 10 cm³ size. Hirsutism was graded as per Ferriman-Gallwey score¹³ and hirsutism is considered when FG score is ≥8.

Based on above criteria, the study group was divided into PCOS and non PCOS group. They were studied for age, weight, height, body mass index (BMI), menstrual history and cutaneous features in both the groups separately. Women's BMI (kg/m²) was calculated as per international classification. The study considered < 18.50 BMI as underweight, normal 18.50-24.99, over weight ≥25.00 and obese ≥30.00. Cutaneous examination included type of skin (oily / dry / normal), severity of acne as described by Pochi¹⁴ (mild, moderate and severe), hirsutism and acanthosis nigricans.

The statistical analysis was performed using STATA 15.1. The data was expressed as mean ±SD. Simple statistics was used to summarize with mean and standard deviation. Means were compared with t-student test among two groups. The tests used chi-square test. $P < 0.05$ was considered statistically significant.

III. Results

150 women with acne participated in the study and there were no drop outs. The study observed oligomenorrhoea in 40 patients (26.66%). None of the patient had amenorrhoea. Polycystic ovaries in pelvic USG were observed in 46 (30.66%) patients and polycystic ovary syndrome (PCOS) was diagnosed in 66 (44%) patients as per Rotterdam criteria.

Mean age in the PCOS and Non-PCOS group was 21.48±4.88 years & 20.86±3.67 years respectively and mean age of onset was 17±4.56 years in PCOS group and 17.85±3.90 years in non-PCOS group. The mean duration of present episode of acne was 14.14±18.76 months & 8.96±9.72 months in PCOS & non-PCOS group respectively and mean BMI was 21.68±4.40 kg/m² & 20.51±2.73 kg/m² in PCOS and non-PCOS group respectively. There was significant difference in both groups ($p < .01$). Table 1 shows comparison of different parameters characterises of women in PCOS and non-PCOS group.

Table 1: Demographic characteristics of females with acne

Mean	PCOS	non-PCOS	P-Value
Age of the patients (years)	21.48±4.88	20.86±3.67	0.001***
Age of onset of acne (years)	17±4.56	17.85±3.90	
Duration of present episode (months)*	14.14±18.76	8.96± 9.72	
BMI (kg/m ²)*	21.68± 4.40	20.51±2.73	

Out of 66 patients in PCOS group, 34 (51.52%) had mild acne, 16 (24.24%) patients had moderate acne and 16(24.24%) patients had severe grade of acne. In Non-PCOS group, out of 84 patients, 67 (79.76%) patients had mild acne, 13 (15.48%) patients had moderate acne and 4 (4.76%) had severe grade of acne. There was significant difference in both groups (p value = 0.003). (Table 2)

Table 2: Severity of acne in PCOS and non-PCOS patients

SEVERITY OF ACNE	PCOS (N=66)	Non-PCOS (N = 84)	TOTAL (N = 150)	P- Value
Mild	34 (51.52%)	67 (79.76%)	101	0.003**
Moderate	16 (24.24%)	13 (15.48%)	29	
Severe	16 (24.24%)	4 (4.76%)	20	

In PCOS group, out of 66 patients, 30 (45.45%) and in Non-PCOS group, out of 84 patients 14 (16.66%) patients had premenstrual flare of acne. (P^* value =0.000). Out of 66 patients in PCOS group, 36 (54.54%) patients had hirsutism and out of 84 patients in non-PCOS group, 15 (17.85%) patients had hirsutism. (Table 3) There was highly significant difference in both groups (p^{**} =0.000). Difference was not significant for obesity, seborrhoea and acanthosis nigricans.

Table 3: Clinical parameters besides acne in PCOS and non-PCOS patients

	PCOS (N=66)	Non-PCOS (N = 84)
Premenstrual flare*	30 (45.45%)	14 (16.66%)
Obesity	4 (6.06%)	0 (0%)
Oily skin (seborrhea)	34 (51.51%)	48 (57.14%)
Hirsutism**	36 (54.54%)	15 (17.85%)
Acanthosis nigricans	4 (6.06%)	0 (0%)

P^* value =0.000

p^{**} = 0.000

IV. Discussion

In our study, prevalence of PCOS was 44%, which is compatible to the previous studies conducted by Peserico *et al*¹⁵ and Soodabeh zandi *et al*¹¹, in which prevalence of PCOS in acne patients was 45.4 % and 48 % respectively, but higher than the study of Sayera Begum *et al*¹⁶ in which prevalence was 27.5 %. Such findings indicated that PCOS is a common disorder in acne patients and its prevalence is significantly higher in acne patients than general population.

No previous study has been conducted to compare mean age of acne patients in PCOS group and non-PCOS group. In our study, the mean age of the acne patients in PCOS group was 21.48±4.88 years and in non-PCOS group was 20.86±3.67 years. The difference was not statistically significant. The result of the observation in PCOS group was similar with a previous study¹⁶, where mean age of acne patients in PCOS group was 21.5±4.8 years.

In our study we compared age of onset and duration of present acne episode in PCOS group and non-PCOS group. In this study, the mean age of onset of the acne in PCOS group was 17.0±4.56 year and in non-PCOS group was 17.85±3.90 y. The difference was not statistically significant. Mean duration of present episode of acne is significantly higher in PCOS group (14.14±18.76 months) than in non-PCOS (8.96±9.72 months) group. (p value<0.01). Our finding is similar to study conducted by Bugti in 2019, Azziz *et al* in 2009, and Hill in 2003.

Regarding comparison of premenstrual flare of acne in PCOS and Non-PCOS groups; our study finds significant higher number of patients had premenstrual flare of acne in PCOS group (45.45%) as compared with non-PCOS group (16.66%). Hydration of the pilosebaceous follicle is responsible for premenstrual flare of acne.¹⁷ The finding is similar to study conducted by Chanyachailert *et al*.

In our study the mean BMI status of acne patients in PCOS group was 21.68±4.40 kg/m² & in non-PCOS group was 20.51±2.73 kg/m². BMI status in PCOS group was significantly higher than Non-PCOS group (p <0.01). In a previous study mean BMI observed in acne patients with PCOS was 27.5±3.6 kg/m², which was greater than we observed in our study.¹⁶

Out of 66 patients in PCOS group, obesity was observed in 4 patients (6.06%). None of the patient had obesity in non-PCOS group. There was no significant difference in both groups. . This data is differing from a previous study in which obesity was observed in 20.8% and 38.5% in PCOS group and non-PCOS group respectively.¹¹

There is no previous study which compares seborrhea in acne patients with PCOS and without PCOS; however in our study oily skin was observed more in non-PCOS group (57.14%) as compared to PCOS group (51.51%). (p value>0.05)

The compression with severity of acne in PCOS and non-PCOS group; our study observed that severity of acne was significantly associated with PCOS group. Out of 66 patients in PCOS group, 34 (51.52%) had mild acne, 16(24.24%) patients had moderate acne and 16(24.24%) patients had severe grade of acne. In non-PCOS group out of 84 patients, 67 (79.76%) patients had mild acne, 13 (15.48%) patients had moderate acne and 4

(4.76%) had severe grade of acne. ($p=0.000$). Study conducted in by Feng et al. didn't find any difference between PCOS and non-PCOS (Feng et al. 2018). Our finding is similar to study conducted by Khademi et al in 2010.

In our study out of 66 patients in PCOS group, 36 (54.54%) patients had hirsutism and out of 84 patients in non-PCOS group, 15 (17.85%) patients had hirsutism. There was highly significant difference in both groups ($p=0.0000$). Results of our study differ from previous study, in which there was no significant difference in both the groups.¹¹

In our study acanthosis nigricans was observed in 6.06% in PCOS group. None of the patient had acanthosis in Non-PCOS group. There was no significant difference in both groups (p value >0.05). There is no previous data for comparison of acanthosis nigricans in acne patients with and without PCOS but it was observed in 5% PCOS patients.¹⁸

V. Conclusion

Out of 150 patients, PCOS was diagnosed in 66 patients. Results of this study indicate that PCOS is a common disorder in acne patients and its prevalence is significantly higher in acne patients than general population. PCOS is significantly associated with duration and severity of acne. BMI, premenstrual flare, and hirsutism are also significantly associated with PCOS group as compared to non-PCOS group.

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