

## Original Research Article

# Prevalence and pattern of PCOS in women presenting with acne, a hospital based prospective observational study

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### ABSTRACT

**Background:** Acne is one of the most common dermatological conditions encountered in day to day practice. Many recent studies have reported a strong association between acne and underlying systemic endocrine disorders, more particularly Poly cystic ovarian syndrome. But there is scarcity of literature on the subjects in Indian population. Hence the present study was conducted with an objective of studying the association between acne and polycystic ovarian syndrome, in women presenting with adult onset acne to a tertiary care teaching hospital.

**Methods:** A prospective observational study was carried out in department of dermatology, Dhanalakshmi Srinivasan medical college and hospital, Perambalur from January 2016 to August 2017. The study population included women above 18 years of age clinically diagnosed with acne vulgaris. The presence of polycystic ovarian syndrome was assessed using Rotterdam criteria.

**Results:** The final analysis had included 100 women with acne. The most common type of lesion observed was comedone in 91% of women. The other most common lesions were papule seen in 73%, pustule in 35% of women. The proportion with grade I, Grade II and grade III acne was 58%, 29% and 13% respectively. The prevalence of PCOS was 30% (95% CI 21.89% to 39.58%). PCOS had shown no statistically significant association with age, marital status and regularity of menstrual cycle. The factors which have shown statistically significant association were higher BMI, presence of Hirsutism and higher waist circumference.

**Conclusions:** PCOS is highly prevalent among women with acne. Presence of hirsutism, obesity are strong risk factors for PCOS.

**Keywords:** Acne, PCOS

### INTRODUCTION

Acne Vulgaris is one of the most common dermatological condition affecting the adolescents and young adults across the globe and India.<sup>1</sup> Even though considered as disease of teenage it may continue into the 40s and 50s in a minor proportion of the affected subjects.<sup>2</sup> Acne once been considered as mere dermatological condition, resulting in cosmetic disfigurement recent studies have

shown that it is more than a simple dermatological condition and is associated with a plethora of systemic disorders.<sup>3</sup> Acne with onset in adulthood assumes a special importance, as it is proved to be associated with a plethora of systemic conditions, more important being the systemic endocrine abnormalities, notably polycystic ovarian syndrome (PCOS).<sup>4,5</sup> PCOS is one of the commonly reported systemic endocrine disorder associated with acne. Hence many authors have

suggested to have high index of suspicion for PCOS in women with acne of adult onset, associated features suggestive of hypogonadism.<sup>6</sup> But the number of studies available on the subjects on Indian population are very scarce. Hence the present was conducted with the following objectives.

## METHODS

This study was a prospective observational study, carried out in department of dermatology, Dhanalakshmi Srinivasan medical college and hospital, Permabalur from January 2016 to August 2017, over a period of 20 months. The study population included women above 18 years of age presenting to dermatology outpatient department with features suggesting of acne and were confirmed with Acne vulgaris after clinical examination. A total of 100 women who were diagnosed with acne were recruited by purposive sampling into the study.

The inclusion criteria were age of the subject between 18 to 35 years of age and clinically diagnosed as acne. The study has excluded all antenatal women, lactating mothers and women diagnosed with other Acneiform lesions like. Women on certain drug treatments like oral contraceptive pills, ovarian stimulating drug and oral hypoglycemic agents like metformin were excluded from the study.

The study was approved by the institutional human ethics committee of Dhanalakshmi Srinivasan Medical College and Hospital. Informed written consent was obtained from all the participants and confidentiality of the personal data was maintained. Each participant was evaluated by complete medical history, detailed dermatological examination and relevant investigations. The dermatological examination was conducted by visual inspection, with the aid of magnifying lens. Type of lesions and the distribution of acne lesions was assessed. Other cutaneous manifestations of hyperandrogenemia like androgenic alopecia, acanthosis nigricans and hirsutism were also noted. Pelvic Ultrasonography was conducted to assess the presence of polycystic ovaries. The presence of polycystic ovarian syndrome was confirmed, if the patient satisfies Rotterdam criteria.<sup>7</sup>

Data was analyzed by mean and standard deviation for quantitative variables, frequency, and proportion for categorical variables. Presence of PCOS was considered as primary outcome variable.

The association between explanatory variables and categorical outcomes was assessed by cross tabulation and comparison of percentages. Chi square test was used to test statistical significance. P value <0.05 was considered statistically significant.

Data analysis was done by IBM SPSS version 23 was used for statistical analysis.<sup>8</sup>

## RESULTS

A total of 100 women were included in the study. Among the study population, major proportion of participants belonged to 21 to 25 years (42%), followed by 26 to 30 year age group (34%). The proportion of participants below 20 years and above 30 years was 12% each in study population. Major proportion (71%) of study participants were unmarried. Irregular menstrual cycle was reported 38% of the study population.

As per the WHO criteria, only 19% of the participants had BMI in normal weight range. The proportion of women, who were overweight and obese were 49% and 32% in the study population. Waist circumference was high (>88 cm) among 36% of the study subjects. The proportion of women having various degrees of hirsutism was 79%. Alopecia grade 1, 2 and 3 was present in 61%, 28% and 11% respectively. The proportion of women with skin tags was 79% in the study population (Table 1).

**Table 1: Baseline characteristics of the study population (N=100).**

Parameter	Number	Percentage
<b>Age group</b>		
Up to 20	12	12.00%
21 to 25	42	42.00%
26 to 30	34	34.00%
Above 30	12	12.00%
<b>Marital status</b>		
Married	29	29.00%
Unmarried	71	71.00%
<b>Menstrual cycle</b>		
Regular	62	62.00%
Irregular	38	38.00%
<b>BMI</b>		
Below 25	19	19.00%
25 to 30	49	49.00%
above 30	32	32.00%
<b>Waist Circumference</b>		
High (>88 cm)	36	36.00%
Low (≤ 88 cm)	64	64.00%
<b>Hirsutism</b>		
Present	79	79.00%
Absent	21	21.00%
<b>Alopecia</b>		
1	61	61.00%
2	28	28.00%
3	11	11.00%
<b>Skin tags</b>		
Present	79	79.00%
Absent	21	21.00%

The most common type of lesion observed in study population was comedone observed in 91% of study population. The other most common lesions were papule seen in 73% of study subjects, pustule seen in 35% of the study subjects. Nodular and mixed lesions were observed in 13% of the subjects each. Among the study population,

the proportion of subjects with grade I, Grade II and grade III acne were 58%, 29% and 13% respectively (Table 2).

The proportion of women having PCOS was 30% (95% CI 21.89% to 39.58%) in the current study (Table 3).

**Table 2: Characteristics of acne in study population (N=100).**

Acne characteristics	Number	%
<b>Type of lesion*</b>		
Comedone	91	91.00
Papule	73	73.00
Pustule	35	35.00
Nodule	13	13.00
Mixed (> 2 types of lesions)	13	13.00
<b>Severity of acne (as per gags)</b>		
Grade-1	58	58.00
Grade-2	29	29.00
Grade-3	13	13.00

\*The proportion of type of lesion is more than 100% as some of the participants had more than 1 type of lesion.

**Table 3: Prevalence of PCOS in study population (N=100).**

PCOS	Number	Percentage (95% CI)
Present	30	30% (21.89% to 39.58%)
Absent	70	70% (60.42% to 78.11%)

**Table 4: factors affecting PCOS in study population (n=100).**

Parameter	PCOS (N=30)	NO PCOS (N=70)	Chi square value	P value
<b>Age group</b>				
Up to 20	2 (6.666%)	10 (14.28%)	1.307	0.73
21 to 25	14 (46.66%)	28 (40%)		
26 to 30	10 (33.33%)	24 (34.28%)		
Above 30	4 (13.33%)	8 (11.42%)		
<b>Marital status</b>				
Married	10 (33.33%)	19 (27.14%)	0.391	0.53
Unmarried	20 (66.66%)	51 (72.85%)		
<b>Menstrual cycle</b>				
Regular	16 (53.33%)	46 (51.42%)	1.366	0.242
Irregular	14 (46.67%)	24 ((34.28%)		
<b>BMI</b>				
Below 25	4 (13.33%)	15 (21.42%)	8.966	0.011
25 to 30	10 (33.33%)	39 (55.71%)		
above 30	16 (53.33%)	16 (22.85%)		
<b>Waist Circumference</b>				
>88 cm	18 (60%)	18 (25.7%)	10.71	0.001
≤ 88 cm	12 (40%)	52 (74.3%)		
<b>Hirsutism</b>				
Present	28 (93.33%)	51 (72.8%)	5.30	0.02
Absent	2 (6.67%)	19 (27.2%)		
<b>Alopecia</b>				
1	15 (53.33%)	46 (64.28%)	2.537	0.281
2	10 (30%)	18 (25.71%)		
3	5 (16.67%)	6 (8.57%)		
<b>Skin tags</b>				
Present	24 (80%)	55 (78.57%)	0.026	0.87
Absent	6 (20%)	15 (21.42%)		

Among the 30 people with PCOS group, 2 (6.66%) participants aged up to 20 years, 14 (46.66%) participants aged between 21 to 25 years, 10 (33.33%) participants aged between 26 to 30 years and 4 (13.33%) participants aged above 30 years. Among the 70 people without PCOS group, 10 (14.28%) participants aged up to 20 years, 28 (40%) participants aged between 21 to 25 years, 24 (34.28%) participants aged between 26 to 30 years and 8 (11.42%) participants aged above 30 years. The difference in the proportion of PCOS group and age group was statistically not significant. (p value 0.73). Among the 30 people with PCOS group, 10 (33.33%) participants were married, and 20 (66.66%) participants were unmarried. Among the 70 people without PCOS group, 19 (27.14%) participants were married, and 51 (72.85%) participants unmarried. The difference in the proportion of PCOS group and marital status was statistically not significant. (p value 0.53). Among the 30 people with PCOS group, 16 (53.33%) women had regular menstrual cycle, and 14 (46.67%) women had irregular menstrual cycle. Among the 70 people without PCOS group, 46 (51.42%) women had regular menstrual cycle, and 24 (34.28%) women had irregular menstrual cycle. The difference in the proportion of PCOS group and menstrual cycle status was statistically not significant. (p value 0.242). Among the 30 people with PCOS group, 4 (13.33%) participants were had BMI below 25, 10 (33.33%) participants were had BMI 25 to 30, and 16 (53.33%) participants were had BMI above 30.

Among the 70 people without PCOS group, 15 (21.42%) participants were had BMI below 25, 39 (55.71%) participants were had BMI 25 to 30, and 16 (22.85%) participants were had BMI above 30. The difference in the proportion of PCOS group and BMI was statistically significant (p value 0.011). Among the 30 people with PCOS group, 18 (60%) participants had high (> 88cm) waist circumference, and this proportion was only 25.7% among women without PCOS the difference in the proportion of PCOS group and waist circumference status was statistically not significant (p value 0.001). Among the 30 people with PCOS group, 28 (93.33%) were had hirsutism. Among the 70 people without PCOS group, 51 (72.8%) were had hirsutism. The difference in the proportion of PCOS group and hirsutism status was statistically not significant (p value 0.02).

Among the 30 people with PCOS group, 15 (53.33%) were had alopecia 1, 10 (30%) were had alopecia 2 and 5 (16.67%) were had alopecia 3. Among the 70 people without PCOS group, 46 (64.28%) were had alopecia 1, 18 (25.71%) were had alopecia 2 and 6 (8.57%) were had alopecia 3. The difference in the proportion of PCOS group and alopecia was statistically not significant. (p value 0.408). Among the 30 people with PCOS group, 24 (80%) were had skin tags. Among the 70 people without PCOS group, 55 (78.57%) were had skin tags. The

difference in the proportion of PCOS group and skin tags was statistically not significant. (p value 0.87) (Table 4).

## DISCUSSION

Considering the increasing reports of systemic endocrine defects and a strong association of Acne vulgaris with polycystic ovarian syndrome, the present study was conducted among women with adult onset acne to explore this association. Majority of the women in the study belonged to 20 to 25 years of age group, 38 % of them had irregular menstruation and 32% had BMI above 30. Among the study population, 36 (36%) had high waist circumference and 64 (64%) had low waist circumference. Among the study population, 91 (91%) had hirsutism. Among the study population number of alopecia 1, 2 and 3 was 61 (61%), 28 (28%) and 11 (11%) respectively. Come done was the most common type of lesion seen in 91% of the study population.

The proportion of women having PCOS was 30% (95% CI 21.89% to 39.58%) in the current study. The prevalence of PCOS reported among women with acne is quite variable across the literature. In their study, Betti R et al have assessed prevalence of PCOS by ultrasonography and reported 52.17% women with PCOS.<sup>9</sup> Kelekci KH et al, in their comparative study of women with Acne and a healthy control group have reported a prevalence of PCOS as 26.9% in women with Acne and 8.4% in age matched controls.<sup>10</sup>

Maluki AH et al have also reported similar findings, where the prevalence of PCOS reported among women with resistant Acne was 51.2%, and 6.2% of the healthy control group had PCOS.<sup>11</sup> Abdullah Z et al have diagnosed PCOS among 28.8% of Acne cases and 9.3% in controls.<sup>12</sup> Zandi S et al have reported a prevalence of 48.3% using sonography methods and 60.2% as per NIH criteria. Around 54% of the patients complained of hirsutism and 37% of them suffered from menstrual disturbances.<sup>13</sup>

PCOS had shown no statistically significant association with age of the women, marital status and regularity of menstrual cycle. The factors which have shown statistically significant association were higher BMI of the women, presence of Hirsutism, Higher waist circumference. The proportion of women with BMI more than 30 was more in PCOS group as compared to Non PCOS group (53.33% vs 22.85%, p value 0.011), which was statistically significant. The proportion of women with waist circumference more than 88 cm was also higher among PCOS women, as compared to non PCOS women (60% vs 25.7%, p value 0.001), which was also a statistically significant difference between two groups. Higher proportion of women in PCOS group had Hirsutism, as compared to women in non PCOS group (93.33% vs 72.8%, p value 0.02).

These findings were in confirmation with some of the studies published on the subject in the past. In study by Zandi S et al about 54% of the women with PCOS complained of hirsutism and 37% of them suffered from menstrual disturbances.<sup>13</sup> Falsetti, L et al have demonstrated a strong association between acne, hirsutism and various hormonal dysfunctions among women with PCOS.<sup>14</sup> Lee, A T et al have documented a strong association between various cutaneous markers of hyperandrogenism chiefly hirsutism, acne vulgaris, and androgenetic alopecia.<sup>15</sup>

Hence presence of obesity, higher waist circumference and other cutaneous markers of hyperandrogenism should raise a strong suspicion towards presence of underlying PCOS among women with Acne. These women shall be subjected to appropriate diagnostic evaluation to diagnose PCOS in time and treat them effectively to prevent long term physical and psychological consequences of this systemic endocrine dysfunction.

## CONCLUSION

The PCOS is highly prevalent among women with adult onset Acne. The factors which have shown statistically significant association with presence of PCOS include BMI more than 30, waist circumference >88 cm and presence of hirsutism. Considering this association, dermatologists should have high index of suspicion for PCOS in women presenting with acne and should facilitate appropriate evaluation and management.

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