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A Hospital Based Prospective Study to Evaluate the Cutaneous Manifestations of Polycystic Ovarian Syndrome (PCOS) Patients

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Abstract

Background: Polycystic Ovarian Syndrome, commonly known as PCOS, is an endocrine disorder seen in women of reproductive age. The excessive secretion of androgens in PCOS patients results in a series of skin changes. Hence, the aim of this study was to determine the cutaneous manifestations in PCOS patients. **Materials & Methods:** A prospective study with a total 50 patients with features suggestive of PCOS attending department of dermatology, venereology and leprosy and department of obstetrics and gynecology in a government S.K. Medical College, Sikar, Rajasthan were screened. Hirsutism was defined as a Ferriman and Gallwey score >8. Androgenetic alopecia was evaluated according to Ludwig's classification. Insulin resistance was determined by calculating Homeostatic model assessment of Insulin resistance (HOMA-IR) score. Values >2.5 were taken as compatible with significant insulin resistance. Chi square (χ2) test was performed and exact test was used when the expected frequency is less than 5. **Results:** The present study showed that mean age of incidence was 24.27 years. The mean BMI in the PCOS patients was 27.13 kg/m^2 with standard deviation of 4.38. The prevalence of hirsutism, acne, female pattern hair loss, acanthosis nigricans, seborrhea, and acrochordons was found to be 86%, 74%, 32%, 30%, 50%, and 10%, respectively. The most common hormonal abnormality in the study patients was insulin resistance in 54% patients, followed by raised free testosterone in 20% patients and serum prolactin in 18% patients. **Conclusion:** Success in the effective management of women with PCOS is through a synchronized effort between the dermatologist, endocrinologist, gynecologist, nutritionist, and physical trainer.

Keywords: PCOS, Hirsutism, Insulin Resistance, Cutaneous Manifestations.

Introduction

Polycystic Ovarian Syndrome, commonly known as PCOS, is an endocrine disorder seen in women of reproductive age[1]. Polycystic Ovarian Syndrome is estimated to affect four to twelve percent of women throughout the world and is most commonly characterized by hyperandrogenism and insulin resistance, each of which affect sixty to eighty percent of PCOS patients and fifty to eighty percent of PCOS women, respectively[2].

The excessive secretion of androgens in PCOS patients results in a series of skin changes including hirsutism, acne, seborrhea, androgenetic alopecia, acanthosis nigricans and acrochordons[3]. Recently, PCOS has been associated with obesity, insulin-resistance (IR), and a risk of developing Type 2 diabetes mellitus (T2DM)[4]. The metabolic and reproductive abnormalities predispose women to develop infertility and endometrial cancer, necessitating early diagnosis and appropriate treatment[5].

A revised definition of PCOS was proposed in 2003 at an international joint consensus meeting of the European Society for Human Reproduction and Embryology and the American Society for Reproductive Medicine[6,7].

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Hirsutism is defined as excessive growth of terminal hair in androgen-dependent areas in women. Acne is found in a large number of PCOS patients as inflammatory lesions on the lower face, neck, chest, and upper aspect of the back. Although sole presence of acne is a potential marker of hyperandrogenism, it is clear that most acne patients do not have androgen excess[8]. Changes in physical appearance, such as hirsutism and obesity, seem to play the greatest role in the psychosocial manifestations[9]. Early diagnosis and early treatment may prevent metabolic complications and the psychological impact that may negatively impact the patient's quality of life. Hence, the aim of this study was to determine the cutaneous manifestations in PCOS patients.

Materials & methods

A prospective study with a total 50 patients with features suggestive of PCOS attending department of dermatology, venereology and leprosy and department of obstetrics and gynecology in a government S.K. Medical College, Sikar, Rajasthan were screened.

Inclusion Criteria
- All female patients with cutaneous manifestations of PCOS
- Menarche to menopause.

Exclusion Criteria
- Pregnant women
- Diagnosed case of any other endocrine disorder (eg. hypothyroidism, hyperprolactinemia, congenital adrenal hyperplasia)
- Patients taking medications like oral contraceptive pills

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Methods

A detailed history of patients including age, marital status, family history, menstrual history, treatment history and history of infertility was taken. The body mass index (BMI) was calculated using the formula [weight (kg)/height (m)2]. Waist:hip ratio (WHR) was calculated with ≥0.85 considered to be abnormal.

Hirsutism was assessed using Ferriman Gallwey (F-G) score, quantitating the presence of terminal hairs over nine body areas (i.e. upper lip, chin, chest, upper and lower abdomen, upper and lower back, upper arms and thighs). Hirsutism was defined as a Ferriman and Gallwey score >8. Androgenetic alopecia was evaluated according to Ludwig's classification.

To diagnose PCOS, patient's pelvic ultrasonography was done mid cycle. Hormonal profile was done on day 2 of menstrual cycle. For amenorrhoeic patients, blood was drawn on any day of the cycle. Fasting venous blood was drawn for FBS, FSH, LH, free testosterone, DHEAS, TSH, fasting insulin, prolactin levels.

Insulin resistance was determined by calculating Homeostatic model assessment of Insulin resistance (HOMA-IR) score. Values >2.5 were taken as compatible with significant insulin resistance.

Statistical Analysis

For comparing categorical data, Chi square ($\chi2$) test was performed and exact test was used when the expected frequency is less than 5. A probability value (p value) less than 0.05 was considered statistically significant. All statistical calculations were done using SPSS version 24.

Results

The present study comprised 50 female patients diagnosed to have PCOD. The anthropometric characteristics of the study population including age, BMI, and W/H ratio are given in Table 1. Mean age of incidence was 24.27 years.

As per BMI, the prevalence of obesity and overweight in our study group was 28% and 52%, respectively, whereas 20% of our patients in the study group had a normal weight. The mean BMI in the PCOS patients was 27.13 kg/m^2 with standard deviation of 4.38. Among 50 study patients, 6 patients were married whereas 44 were unmarried. A total 34% patients had Waist:Hip ratio more than 0.85 and hence increased risk of metabolic syndrome whereas 66% patients had Waist:Hip ratio less than 0.85. Ultrasonological evidence of PCOS changes was present in 90% patients (table 1).

Table 1: Demographic profile of patients

Demographic profile	No. of patients (N=50)	Percentage
Age groups		
18-20yrs	19	38%
21-30yrs	28	56%
31-40yrs	3	6%
Mean±SD	24.27±3.72	
Marital status		
Married	6	12%
Unmarried	44	88%
BMI (kg/m2)		
Normal BMI	10	20%
Overweight	26	52%
Obese	14	28%
Mean±SD	27.13±4.38	
Waist/hip ratio		
>0.85	17	34%
<0.85	33	66%
Mean±SD	1.07±0.33	
Ultrasonological changes.		
PCOS	45	90%
No E/O PCOS	5	10%

The prevalence of hirsutism, acne, female pattern hair loss, acanthosis nigricans, seborrhea, and acrochordons was found to be 86%, 74%, 32%, 30%, 50%, and 10%, respectively (table 2).

Table 2: Presenting cutaneous manifestations with PCOS patients

Cutaneous manifestations	No. of patients (N=50)	Percentage
Hirsutism	43	86%
Acne	37	74%
Female pattern hair loss	16	32%
Seborrhea	25	50%
AGA	18	36%
Acanthosis nigricans	15	30%
Acrochordons	5	10%

The most common hormonal abnormality in the study patients was insulin resistance in 54% patients, followed by raised free testosterone in 20% patients and serum prolactin in 18% patients (Table 3).

Table 3: Increased hormone levels in the study group

Increased hormone levels	No. of patients (N=50)	Percentage
FSH	3	6%
LH	9	18%
FSH/LH	8	16%
Free Testosterone	10	20%
DHEAS	2	4%
S. prolactin	9	18%
TSH	4	8%
HOMA-IR	27	54%

Discussion

Patients with PCOS presented to us with hirsutism and acne being their main concern with additional features of androgenetic alopecia, seborrhea, acanthosis nigricans and acrochordons. Although PCOS is a heterogeneous disorder without an easily identified single etiology, the key pathophysiologic components appear to include androgen excess, abnormal gonadotropin dynamics, and IR. Excess androgen production in the ovary impairs follicle maturation, leading to follicular atresia and decreased reproductive function. In addition, the resultant hyperandrogenemia may produce clinical hyperandrogenism. Whether due to an underlying primary hypothalamic defect in the gonadotropin releasing hormone (GnRH) pulse generator or a secondary effect of low levels of progesterone resulting from oligo- or anovulation,[10] an increased pulse frequency of hypothalamic GnRH is thought to produce elevated levels of luteinizing hormone (LH) found in women with PCOS[11]. This increase in LH secretion relative to FSH stimulates production of androstenedione by ovarian theca cells. Insulin also plays a central role in PCOS pathophysiology, acting to increase androgen levels by direct and indirect mechanisms[12].

In this study, mean age of incidence was 24.27 years which was comparable with the studies carried out by Keen et al[13], Jain et al[14], while in a study by Mukkamala et al[15], mean age of incidence was 12.8 years.

In this study, 52% of the patients were overweight and 28% were obese while in study by Ramanand et al[16], obesity was present in 54% patients and 16% patients were overweight, in study by Keen et al[13], obesity was present in 27% patients and 53% patients were overweight.

Among cutaneous manifestations of PCOS, hirsutism was the most common finding occurring in 86% patients similar to study by Keen et al[13] and Jain et al[14]. In contrast studies by Gowri et al[3], Hong et al[17], Fang et al[18] showed acne to be the most common manifestation. Mukkamala et al[15], found acanthosis nigricans as the most common presentation in cases of PCOS.

The most common hormonal abnormality in this study was insulin resistance in 54% patients, followed by raised free testosterone in 20% patients whereas in study by Gowri et al[3], raised testosterone levels in 55% patients was the most common manifestation. In study by Keen et al[13], raised LH/FSH in 38% patients followed by testosterone levels in 28% patients were the most common manifestations.

Conclusion

Dermatological manifestations may provide early clinical clues to the recognition of PCOS, and treatment of these cutaneous conditions may improve the patient's quality of life and psychological well-being.

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