

Original Article

A Detailed Cutaneous Manifestations Evaluation in Patients with Polycystic Ovary Syndrome

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Received: June 8, 2020; Accepted: October 27, 2020

Abstract

Background and Aim: Polycystic ovary syndrome (PCOS) is the most common endocrine disorder among women of reproductive age. The hypothalamus-pituitary-ovary axis dysregulates in PCOS, ultimately leading to hyperandrogenisms. Consequently, it is associated with hirsutism, dyslipidemia, obesity, infertility, menstrual disturbance, and insulin resistance. To our knowledge, there is no detailed investigation of these manifestations. That is why, this study aimed to evaluate manifestations of hyperandrogenism, hirsutism in particular.

Methods: This study was performed on 39 women with an initial diagnosis of polycystic ovary syndrome. Rotterdam criteria including Oligo- or anovulation, hyperandrogenism clinical and/or biochemical signs, and ultrasound appearance of polycystic ovaries used as diagnostic criteria. Hirsutism scoring was carried out according to Freeman-Gallwey's definition of hirsutism. The patients were analyzed for other skin problems including male pattern baldness, acanthosis nigricans, and acne as well as demographic features.

Results: Hirsutism was observed in the majority of our patients (91%) ranging from mild to severe. Concerning the distribution of hirsutism on various parts of the body, severe hirsutism was observed more on the groin, abdominal area, and chin respectively. Male pattern baldness, acanthosis nigricans, and acne, and dysregulated menstruation were reported in these patients.

Conclusion: This investigation found that skin manifestations, especially hirsutism, are highly frequent in patients with PCOS.

Keywords: Polycystic Ovary Syndrome; Hyperandrogenism; Testosterone; Androgen; Hirsutism.

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Please cite this article as: Masaeli A, Nayeri H, Mirzaei M. A Detailed Cutaneous Manifestations Evaluation in Patients with Polycystic Ovary Syndrome. Arch Med Lab Sci. 2021;7:1-6 (e10).

<https://doi.org/10.22037/aml.v7.30828>

Introduction

Polycystic ovary syndrome (PCOS) is a serious health problem in women all around the world yet. PCOS is the most frequent endocrine disorder and ovarian malfunction in women and causes dozens of problems for those affected by (1). It affects around 6% to 20% of women of their reproductive age according to different diagnostic criteria (2).

The PCOS is characterized by manifestations of excessive androgen secretion (hyperandrogenism) including ovulatory dysfunction, and polycystic morphology of ovaries (3, 4). It is asserted that underlying reasons for hyperandrogenism originated from infancy or embryonic stages of life (5). Irregular menses (oligomenorrhoea or

amenorrhea) and hirsutism are also reported as common manifestations of PCOS. Moreover, the patients have a raised risk of having difficulty in pregnancy (2, 4). Besides, it is indicated that approximately 50 to 80% of patients suffer from obesity (6). Lower levels of high-density lipoprotein (HDL) cholesterol and higher levels of triglyceride and low-density lipoprotein (LDL) cholesterol in PCOS, in comparison with normal individuals, is also reported (7). Hirsutism is an abnormal cutaneous condition due to hyperandrogenism in which the male pattern of terminal hair growth occurs (2). It is indicated that approximately 60% of women with hirsutism are diagnosed as PCOS cases (8). Hirsutism scoring is

based on a modified Ferriman–Gallwey scoring chart (9).

In the PCOS, the steroidogenesis rate in ovaries' theca cells is higher than the normal condition which leads to its increased androgen secretion (10). It seems that this excessive androgen disrupts negative feedback of progesterone on gonadotropin-releasing hormone (GnRH) pulse generator of hypothalamus due to androgen receptor blockers (11, 12). Rapid GnRH secretion causes higher luteinizing hormone (LH) secretion from the anterior pituitary and a relative decrease of the follicle-stimulating hormone. (FSH) Subsequently, the higher LH causes more steroidogenesis in theca cells of the ovaries and ultimately hyperandrogenemia in the PCOS (4, 11, 12). Moreover, resistance to insulin and subsequent hyperinsulinemia due to the intrinsic defect of insulin action is another challenge in these patients. Hyperinsulinemia increase androgen level through three different mechanisms: by increasing LH dependent androgen secretion from theca cells, by corticotropin dependent androgen secretion from adrenal and the last, reduction in hepatic production of SHBG and subsequent increase in bioavailable free testosterone (4, 13). Even though lots of investigation has been carried out on skin manifestations in PCOS, regard to our search on various databases such as PubMed and Google Scholar, we did not find any investigation conducting on the determination of Hirsutism and other related cutaneous manifestations in a detailed manner in patients with PCOS. They just reported general scoring of these manifestations in PCOS while this is indispensable to know the exact figures in every part of the body. This is why the current investigation sought to evaluate the manifestation of hyperandrogenism in patients with PCOS.

Methods

Thirty-nine women adults with an initial diagnosis of polycystic ovary syndrome in the age range of 20 to 40 years ($BMI \leq 30 \text{ kg/m}^2$) were recruited at Dr. Mohammadreza Mirzaei clinic located in Najafabad Azad University. Any patients under metformin or hormonal therapy over the previous three months

were excluded. Moreover, the patients with pregnancy, thyroid dysfunction, neoplasms, prediabetes (including impaired glucose tolerance and impaired fasting glucose), diabetes, hypertension, liver diseases, and renal impairment (serum creatinine 120 mol/L) were excluded. Rotterdam criteria including Oligo- or anovulation, hyperandrogenism clinical and/or biochemical signs, and ultrasound appearance of polycystic ovaries with the exclusion of other etiologies (congenital adrenal hyperplasia, androgen-secreting tumors, Cushing's syndrome) used as diagnostic criteria (14). By an endocrinologist, a validated questionnaire was filled for each patient. The questioner was asking for general demographic information (lifestyle, medication, and family history), medical history (like diabetes, hypertension, and dyslipidemia), and menstrual and fertility history. Ethical approval (IR.LAU.NAJAFABAD.REC.1394.14) was obtained from the committee of Islamic Azad University, Najafabad Branch, and signed consent obtained from each participant. The body mass index (BMI) of each patient was calculated with a standard formula. Hirsutism is the patients who were scored according to the Freeman-Gallwey definition (Table 1) (9). The patients were analyzed for other skin problems including male pattern baldness, acanthosis nigricans, and acne as well.

Table 1. Freeman-Gallwey definition of hirsutism

Degree of hirsutism	Distribution status
<8	Normal
8-16	Mild
17-25	Moderate
>25	Severe

Results

This investigation carried on 39 women with the age range of 20–40 years who had met the Rotterdam diagnostic criteria for PCOS.

Demographic features and BMI:

Demographic features were obtained by the questioner. Most of our patients were housewives (41%) and around one-third was a student and employed each. Around half of the cases were

married and had enough daily activity. The greater proportion of the patients had not got children and were not under any special diet (79.4%) (Table 2).

After BMI calculation, it was found that great proportions of our patients is overweight (43.6%) and near half of them are normal. However, three patients were underweight (Table 3).

Table 2. Demographic features of the study participants

Feature	Frequency [n=39 (100.0%)]
Employment	Housewife
	Student
	Employed
Marital status	Single
	Married
Child	Has a child
	No child
Diet	No diet
	Under anti-obesity medicines
	Home diet
Activity	Active
	Nonactive

Table 3. BMI index status among the patients

Status	Frequency (n=39)
Underweight (BMI<18 kg/m²)	3 (7.7)
Normal weight (18 kg/m²<BMI<25 kg/m²)	19 (48.7)
Overweight (25 kg/m²<BMI<29/9 kg/m²)	17 (43.6)

Hyperandrogenism manifestations

Hirsutism

The study participants were analyzed for hirsutism in various regions of their bodies concerning Freeman-Gallwey criteria. It was found that the vast majority of the patients (40%) have moderate hirsutism. The figures for mild and normal hirsutism were found to be 31% and 20% respectively. Moreover, a small proportion of the patients (around 9%) had severe hirsutism (Figure 1).

Concerning the distribution of hirsutism on various parts of the body, severe hirsutism was observed more on the groin, abdominal area, and chin respectively. Moderate hirsutism was seen more on the chest additionally but less on the groin. The highest figures for mild hirsutism were recorded for

the chin and chest. The lumbar area has the least hirsutism among our patients (Table 4).

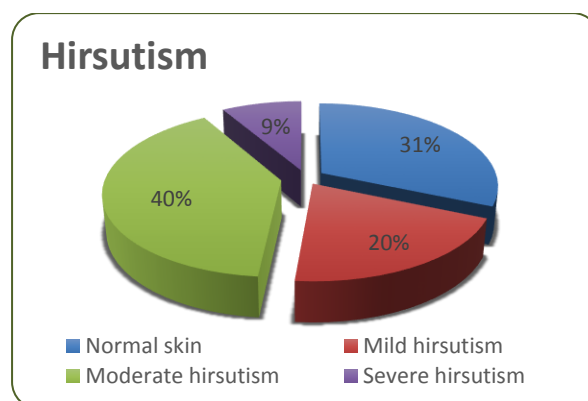


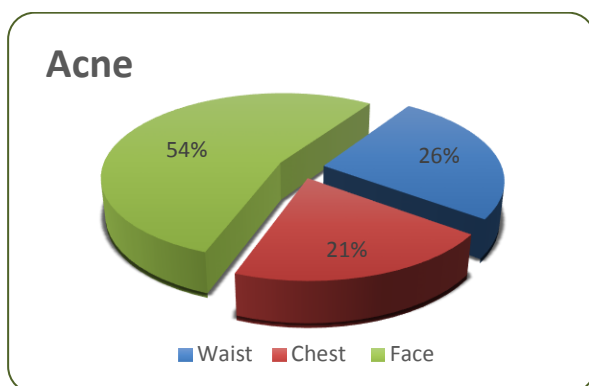
Figure 1. Hirsutism distribution in the patients according to the Freeman-Gallwey definition. Near half of the patients (40%) had severe hirsutism.

Table 4. Evaluation of the hirsutism distribution in a different region of the body

Hirsutism	Severe n:39 (%)	Moderate n:39 (%)	Mild n:39 (%)	None of them n:39 (%)
Behind the lips	6 (15.3)	7 (17.9)	8 (20.5)	18 (46)
Chin	11(28.2)	10 (25.6)	9 (23)	9 (23)
Chest	4 (10.2)	11 (28.2)	14 (35.8)	10 (25.6)
Lumbar area	4 (10.2)	9 (23)	6 (15.3)	20 (51.2)
Abdominal area	12 (30.7)	11(28.2)	7 (17.9)	9 (23)
Groin	17 (43.5)	7 (17.9)	4 (10.2)	11 (28.2)
Around the buttocks	7 (17.9)	7 (17.9)	5 (12.8)	20 (51.2)

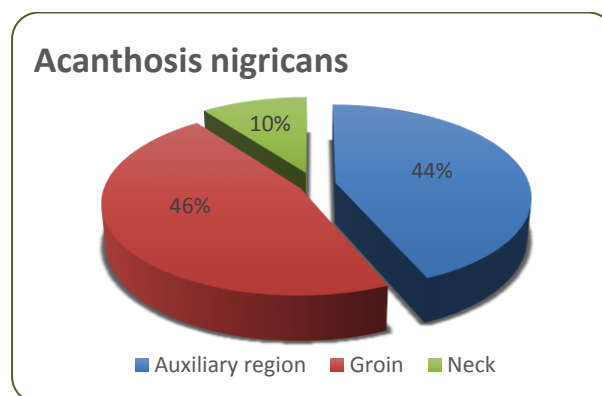
Table 5: hyperandrogenism clinical manifestation among the patients

Manifestation	Frequency	n=39 (100.0%)
Menstrual status	Oligomenorrhea	23 (59%)
	Amenorrhea	2 (5%)
	Regular menses	14 (36%)
Ovarian cysts	With cysts	26 (~66.7%)
	Without cysts	13 (~33.3%)
Acne	With acne	26 (~66.7%)
	Without acne	13 (~33.3%)
Acanthosis nigricans	With acanthosis nigricans	27 (~69.23%)
	Without acanthosis nigricans	12 (~31.87%)
Male pattern baldness	With baldness	20 (~51.2%)
	Without baldness	19 (~47.7%)

**Figure 2.** Distribution of acne in the patients. Near half of the patients had acne on their face.**Other manifestations:**

The patients had various patterns of menstruation. Around two-third had Oligomenorrhea and just two patients had Amenorrhea while 14 people (out of 39) had regular menses. A considerable number of our patient does did not show cysts in sonography of their ovaries. Around half of them had male pattern baldness. Acanthosis nigricans and acne also were commonly observed in our patients (Table 5). Concerning the different parts of their

body, face and groin were the most parts affected by acne and acanthosis nigricans respectively (Figures 2 and 3).

**Figure 3.** Distribution of acanthosis nigricans in the patients, 46% of patients with acanthosis nigricans, manifested this disorder on their groin and 44% in the auxiliary region.**Discussion**

Polycystic ovary syndrome is the most frequent endocrine disorder and ovarian malfunction in women because of changed hypothalamic-pituitary-

ovarian interaction (1). Hyperandrogenism is a hallmark property of PCOS and causes clinical manifestation like hirsutism, acne, alopecia, and menstrual cycle disturbances (15). This investigation was aimed to evaluate hyperandrogenism manifestation in women with PCOS.

A vast majority (approximately 60%) of our patients had oligomenorrhea while amenorrhea was recorded in only two cases. Besides, 36% were without menstrual disturbance. This result does not corporate with Ovalle et al. who have reported that 15% and 50% of their patients have oligomenorrhea and amenorrhea respectively (16). In an investigation on 1297 women with PCOS, was indicated that regulated menstruation progressively raised by aging. Moreover, they found menstrual cycle disturbance is more observed in “classic” PCOS phenotypes (anovulation, hyperandrogenemia, and polycystic ovaries (17).

It is claimed that hirsutism is considered as a main clinical marker of hyperandrogenisms in all PCOS guidelines, that is why it is one of the diagnostic criteria (18-21). Concerning our results, 91% of our patients had hirsutism, ranging from mild to severe. This result agrees with previous studies that report hirsutism as a common (65-75%) cutaneous manifestation of PCOS (22-24). However, it is asserted that some PCOS cases may have not cutaneous manifestation despite their elevated androgen levels or may have acne and/or hair loss without significant hirsutism (19). It seems not only hirsutism affected by circulating androgen level but it is also influenced by local androgen and growth factors concentrations and follicles' androgen sensitivity (19). Our findings showed that various parts of the body have different hirsutism scores. The reason may lie in the aforementioned variables. Acne which is another common cutaneous manifestation of PCOS, found in 66.7% of the patients. However, it is claimed that the prevalence of acne in PCOS could alter ethnic composition (19). Around 33% of our patients had not ovarian cysts. Concerning previous studies, PCOS women may have not ovarian cysts or a woman with cyst might not be PCOS cases (25).

Conclusion

In conclusion, polycystic ovary syndrome is still a great concern for women of reproductive age all around the world. Hirsutism, a hyperandrogenism's clinical sequela, is one of the most frequent coetaneous manifestations among the patients. The current study finds that skin problems like hirsutism are frequent among these patients.

Conflict of Interest

The authors declared that they have no conflict of interest.

Acknowledgment

We deeply appreciate Dr Mirzaei for his cooperation and kind advices

Funding/Support

The authors declared that there were no financial supports.

Ethics

Ethical approval (IR.IAU.NAJAFABAD.REC.1397.14) was obtained from the committee of Islamic Azad University, Najafabad Branch, and signed consent obtained from each participant.

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