Prevalence and hormonal profile of polycystic ovary syndrome in young Kashmiri women presenting with hirsutism: A hospital based study

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Background: Hirsutism, a common clinical condition, not only causes cosmetic concern but may also be a sign of underlying disease. Polycystic ovary syndrome (PCOS) is an important and common cause of hirsutism. In fact, many women with PCOS present as hirsutism. This study assessed young Kashmiri women presenting as hirsutism, for ultrasonographic evidence of polycystic ovaries (PCO), in addition to recording their clinical and hormonal profile. The purpose of this study was to determine the prevalence of polycystic ovary syndrome using ultrasonography, in young Kashmiri women presenting as hirsutism.

Method: In total, one hundred and seventy (170) consecutive young Kashmiri women presenting with chief complaint of hirsutism were assessed. A total of eighty (80) age matched non- hirsute females having normal menstrual cycles, served as controls. The ovaries were visualised by transabdominal ultrasonography (USG). The serum was analysed for luteinizing hormone (LH), follicle stimulating hormone (FSH), total testosterone (tT), prolactin (PRL) and thyroid stimulating hormone (TSH).

Result: The study showed prevalence of 61.18% PCOS in young Kashmiri women presenting as hirsutism. PCOS was diagnosed in 35.11% hirsute women with regular menses and ultrasonography was used to identify PCO in 90.35% patients. Biochemical hyperandrogenemia was present in 70.15% of the patients and the LH/FSH ratio increased in 81.73% of the patients.

Conclusion: The results of this study show a high prevalence of PCOS in young Kashmiri women presenting as hirsutism and also highlights the fact that PCOS is not necessarily associated with menstrual disturbances. Therefore, all hirsute women, even with regular menses, should be evaluated for PCOS.

Keywords: hyperandrogenism, hirsutism, menstural disturbances, polycystic ovarian syndrome, ultrasonography

INTRODUCTION

Hirsutism is a common clinical condition characterized by excessive terminal hair growth with a male pattern distribution. It is the most common clinical manifestation of hyperandrogenism in women [1]. Hirsutism not only causes cosmetic concern but may also be a sign of underlying

disease. Polycystic ovary syndrome (PCOS) is a common and important cause of hirsutism. PCOS was originally described by Stein and Leventhal in seven women, as a combination of hirsutism, obesity, amenorrhea and enlarged bilateral polycystic ovaries [2]. It has become the commonest endocrine disorder in women of reproductive age. Epidemiological studies using the NIH criteria [3] have reported a prevalence of 6.5-8% in women of reproductive age, on the basis of biochemical and/or clinical evidence [4-7], whereas ultrasound based studies using the ESHRE/ASRM Rotterdam criteria [8] have reported a prevalence of 20% or more [9-12]. PCOS has also been noted to affect 28% of unselected obese and 5% of slim women. The exact pathogenesis of PCOS is still unclear but is probably multifactorial. Hypothalamic pituitary abnormalities, ovarian dysfunction, obesity, genetic and environmental factors all contribute to this complex syndrome. One of the most consistent biochemical features of PCOS is the hypersecretion of androgens. Hyperandrogenemia in PCOS is thought to result from an increased gonadotropin releasing hormone (GnRH) pulse frequency in the hypothalamus. This in turn favours the production of luteinizing hormone (LH) over follicle stimulating hormone (FSH) in the anterior pituitary gland, thus increasing the LH/FSH ratio. LH acts on the cells of the ovarian stroma and increases androgen production. The decreased action of FSH decreases the conversion of androgens to estrogens, in the granulosa cells of the ovarian stroma. Women with PCOS present frequently with complaints of infertility, menstrual irregularity and signs of excess androgen such as hirsutism [8]. Women diagnosed with PCOS from different ethnicities presented with different clinical manifestations [13]. These patients are at increased risk of developing type 2 diabetes mellitus [14], cardiovascular diseases [15], metabolic syndrome [15] and some malignancies like endometrial carcinoma [16]. They are also prone to depression, anxiety and psychosexual dysfunction [17]. Hence, the condition requires early diagnosis and intervention. The prevalence of PCOS is increasing over the world with rising the prevalence of type 2 diabetes mellitus. Although, Kashmir has no recently published data, the observations by endocrinologists, gynecologists, dermatologists and radiologists indicate a significant increase. Considering the fact that ultrasonography (USG)

can directly visualize the ovaries, it was used to identify the presence of polycystic ovaries (PCO) in hirsute women in addition to recording their clinical and hormonal profile. The purpose of this study was to determine the prevalence of PCOS, using ultrasonography, in young women of the Kashmiri ethnic origin presenting with chief complaint of hirsutism.

PATIENTS AND METHODS

All young women of Kashmiri ethnic origin receiving treatment at the Outpatient clinics of the Department of Dermatology of SKIMS Medical College Srinagar, Kashmir over a period of 27 months with the chief complaint of hirsutism and having regular or irregular menstrual cycles. They were informed and asked to participate in the study. A total of 170 consecutive women (age group 17-36 years) who agreed to participate were enrolled into the study. Patients having hyperprolactinemia, endocrinopathies (except hypothyroidism), congenital adrenal hyperplasia and patients already on oral hormonal treatment, anti-androgens or insulin sensitizers were excluded from the study. A total of 80 age-matched apparently healthy, non-pregnant females with normal menstrual cycles and no signs of hirsutism and/or hyperandrogenism served as controls. These women were selected from hospital staff and nursing students who consented to participate in the study. None of them had received any hormonal treatment. Informed consent was obtained from all patients and controls. The institution's ethical committee approved the study and all the guidelines of Helsinki were followed.

Detailed medical history was obtained for all patients. Specific points recorded in history included patients' age, menstrual pattern, age of onset of hirsutism and its rate of progression. Menstrual patterns were defined as regular if length of cycle was between 21 and 32 days. The cycle was considered irregular if the patient had either oligomenorrhea (cycle length over 33 days and under 6 months), polymenorrhea (cycle length less than 21 days) or amenorrhea (absence of menstruation for 6 months or longer). Relevant drug and family history were also recorded. Physical examination included general examination of systems and body mass index (BMI) was calculated as body weight (kg)/ height^2 (m²). Cut -off BMI as Standard Consensus

Statement for Indian population was considered i.e. normal BMI: 18.0–22.9 kg/m²; overweight 23.0–24.9 kg/m²; obesity > 25 kg/m² [18]. Patients were specifically examined for signs of virilization (frontal baldness, loss of female body contours, acne, and muscle bulk) and evidence of insulin resistance (acanthosis nigricans). The degree of hirsutism was assessed using the modified Ferriman Gallwey (mFG) scoring system [19]. Hirsutism was classified as mild (mFG score 9-16), moderate (mFG score 17-25) and severe (mFG score 26-36).

Hormonal profile was assessed in all patients and controls. Blood sampling was done after an overnight fast in the early follicular phase (day 2-5) of menstrual cycle in women with regular menses or random days in a few oligomenorrhic patients. Besides baseline investigations, the serum was analysed for luteinizing hormone (LH), follicle stimulating hormone (FSH), total testosterone (tT), prolactin (PRL) and thyroid stimulating hormone (TSH) by electrochemiluminescence. Transabdominal ultrasonography was performed on the same day by a trained radiologist with a 3-5 MHz convex electronic probe. (Logic P 5 General Electric). The following parameters were evaluated:
1. Presence, number and disposition of follicles in each ovary.
2. Ovarian volume was calculated by measuring the ovarian diameters in three dimensions and assuming an ellipsoid shape using the formula: volume = length × width × thickness × 0.5.
3. Ovarian stromal echogenecity was recorded as normal or increased.

The ultrasonographic diagnosis of polycystic ovaries (PCO) was made in the presence of at least one ovary > 10 ml³ in volume and/or at least one ovary with 12 or more follicles measuring 2-9 mm in diameter [20]. PCOS was diagnosed according to the Androgen Excess Society (AES)-PCOS Society Guidelines 2006 [21]. Statistical analyses were done by SPSS version 11.5. Chi-square test was used for comparison between categoric variables and the Student's *t*-test for comparison of means between two continuous variables. P value < 0.05 was considered as statistically significant.

RESULTS

Out of the 170 patients in the study group, 84 (49.41%) patients had mild hirsutism, 70 (41.18%) patients had moderate hirsutism and the remaining 16 (9.4%) patients had severe hirsutism. Positive family history of hirsutism was present in 52 (30.5%) patients. Menstrual cycle was regular in 94 (55.3%) patients. The remaining 76 (44.7%) patients had irregular cycles which included 61 patients having oligomenorrhea and 15 patients having polymenorrhea. Polycystic ovary syndrome (PCOS) was diagnosed in 104 (61.18%) patients and none of the control group. PCOS was significantly more common in hirsute women with irregular menses (93.42%) than hirsute eumenorrhoic patients (35.11%). Table 1 shows the underlying diagnosis of 170 young hirsute women of the study group. Idiopathic hirsutism (hirsutism with regular menses and normal androgen levels) was diagnosed in 38 (40.42%) patients. Twenty-eight (16.47%) patients had mild biochemical hyperandrogenemia and did not fulfil the diagnostic criteria for PCOS or other endocrinopathies and were categorized as unspecified hyperandrogenism.

The clinical, hormonal and ultrasonographic (USG) findings of hirsute patients with PCOS compared with the controls are given in Table 2. The mean BMI and percentage of overweight/obese individuals were significantly higher in hirsute PCOS women than in controls. Acne was seen in 87 (51.2%) and acanthosis nigricans in 23 (22.1%) hirsute PCOS women and none in the control group. There was no significant difference between these two groups in terms of mean FSH and mean PRL levels but mean LH, mean tT levels and LH/FSH ratio were significantly higher in hirsute PCOS women than in the controls. Only seventy-four (71.15%) hirsute patients with PCOS had biochemical hyperandrogenemia. The LH/FSH ratio was raised (>2) in 85 (81.73%) hirsute patients with PCOS and in only 10 (15.15%) hirsute

Table 1. Diagnosis of 170 young Kashmiri women presenting as hirsutism

Diagnosis	n (%)
Hirsute women with regular menses (n=94)	
PCOS	33 (35.11)
Idiopathic hirsutism	38 (40.42)
Unspecified hyperandrogenism	23 (24.46)
Hirsute women with irregular menses (n=76)	
PCOS (including 9 patients with subclinical hypothyroidism)	71 (93.42)
Unspecified hyperandrogenism	5 (6.57)
Total PCOS	104 (61.18)

**Table 2.** Clinical, hormonal and ultrasound findings in hirsute patients with PCOS compared with controls

Clinical / hormonal/ USG findings	Hirsute patients with PCOS (n=104)	Control subjects (n=80)	Statistical significance
Age (years)	24.1 ± 5.6	25.0 ± 4.4	NS
BMI (kg/m^2)	26.2 ± 4.0	20.2 ± 2.2	P < 0.0001
Overweight (BMI 23.0-24.9 kg/m^2)	17 (16.3)	5 (6.25)	P < 0.0001
Obese (BMI>25 kg/m^2)	20 (19.2)	2 (2.5)	P < 0.0001
Luteinizing hormone (IU/l)	9.3 ± 4.9	5.6 ± 2.8	P < 0.0001
Follicle stimulating hormone (IU/l)	4.5 ± 1.7	4.8 ± 1.5	NS
LH/ FSH ratio	1.7 ± 0.7	1.1 ± 0.5	P < 0.01
Total testosterone (ng/dl)	71.4 ± 27.9	43.0 ± 19.8	P < 0.001
Prolactin (ng/dl)	9.5 ± 5.1	9.9 ± 4.8	NS
PCO morphology*	94 (90.38)	11 (13.7)	P < 0.0001
Ovarian volume (ml^3)*	10.9 ± 4.5	6.1 ± 2.0	P < 0.01
No of follicles*	10.6 ± 3.4	5.2 ± 2.9	P < 0.0001

Data is presented as mean ± SD or n (%) of patients
NS: not statistically significant (P > 0.05)
* on ultrasonography

patients without PCOS. The relationship between the two groups was significant. Nine (8.65%) hirsute patients with PCOS had subclinical hypothyroidism. Ultrasonography (USG) showed polycystic ovaries (PCO) in 94 (90.38%) hirsute patients with PCOS and in only 11 (13.7%) subjects of the control group. Figure 1 shows the ultrasound appearance of a polycystic ovary. There was no significant difference in ovarian volume, follicle number and stromal echogenecity among ovaries in the same patient or control. The PCO was unilateral in four hirsute patients. Therefore,the average values of both ovaries were used for statistical analysis. The mean ovarian volume and number of follicles were significantly higher in hirsute women with PCOS than in controls. Ovarian stromal echogenecity
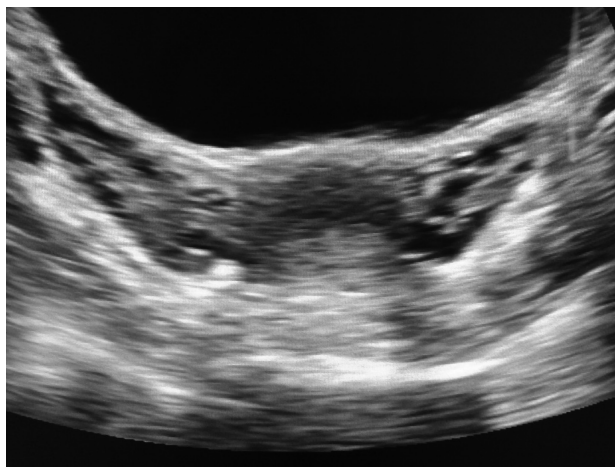
Figure 1. Ultrasonographic appearance of polycystic ovary: Ovary is enlarged and shows multiple 2-9 mm cysts arranged peripherally around an echogenic stroma.

increased in 93 (89.42%) and was normal in the remaining 11 (10.58%) hirsute patients with PCOS. The difference between stromal echogenecity in hirsute PCOS women and controls was statistically significant, as it was normal in all control subjects.

DISCUSSION

In the present study, 61.18% out of the 170 young Kashmiri women presenting as hirsutism were diagnosed with PCOS. This prevalence is comparable to the reported prevalence of 70% in hirsute women of the Indian subcontinent by Chhabra et al [22]. However, previous studies from the Kashmir region of North India have reported lower prevalences compared to this study. In 2001, Zargar et al. [23] in an epidemiological study reported the prevalence of 37.3% PCOS in Kashmiri women presenting as hirsutism. The high prevalence of PCOS in our study can be explained on the basis of a paradigm shift from purely clinical criteria (i.e. NIH criteria 1990) to a combination of both clinical and utrasonographic criteria i.e. ESHRE/ASRM Rotterdam criteria 2003 or AES-PCOS Society Guidelines 2006 [8,21]. In addition, patients with various endocrinopathies that may present as hirsutism were excluded from this study. In the present study, PCOS was diagnosed in 35.11% of hirsute patients with regular menses. Therefore, hirsute women with regular menstrual cycle should also be evaluated for PCOS before being labeled as Idiopathic hirsutism. Ultrasonography identified polycystic ovaries (PCO) in 90.38% of the hirsute

PCOS patients, in the present study. Biochemical hyperandrogenemia was present in only 71.15% and raised LH/FSH ratio in 81.73% of hirsute PCOS patients. The hormonal profile of these patients supports the high sensitivity of ultrasound in identifying polycystic ovaries (PCO). However, in this study, 13.7% of the control subjects also had PCO on ultrasonography. The clinical significance of PCO in these asymptomatic non-hirsute women is unclear.

In conclusion, the results of this study show a high prevalence of PCOS in young Kashmiri women presenting as hirsutism. It also highlights the fact that PCOS is not necessarily associated with menstrual irregularities. Therefore, all hirsute women, even those with regular menses, should undergo hormonal profile determination as well as ultrasonography, for the evaluation of PCOS. Early detection of PCOS is of paramount importance due to the substantial risk of these patients developing metabolic and cardiovascular abnormalities and even some malignancies.

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