Original Article

Comparison of biochemical and ultrasonographic features in hirsute females with polycystic ovarian Syndrome and other causes of hirsutism

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ABSTRACT

Background: Polycystic ovarian syndrome is a heterogeneous disorder and one of the commonest endocrine disorders of women. One of its common presentations is hirsutism.

Objective: The aim of this study was to evaluate the biochemical and ultrasonographic features of PCOS in patients with hirsutism and to compare these features with other etiologies of hirsutism in our setup.

Study Design: Comparative study.

Place and Duration of Study: This study was conducted between 1st September 2007 to 31st December 2008 in the department of Obstetrics and Gynecology, Fauji Foundation Hospital Rawalpindi.

Materials and Methods: All the female patients who presented to gynae and dermatology clinics with hirsutism were included in the study. A detailed history, clinical examination with special reference to Ferriman-Gallwey scoring system, endocrinological workup and abdominopelvic ultrasonography (USG) was done in all patients. We divided the patients into two groups, one labeled as PCOS group (i.e. treatment group) and the other control group including idiopathic hirsutism and other etiologies. Data was analyzed using STATA 11. Multivariant test and logit model was used for statistical analysis.

Results: A total of 74 patients were included in the study, 44 had PCOS and 30 were in the control group with other etiologies of hirsutism.

Regarding the biochemical tests, only serum FSH, LH and progesterone levels showed statistically significant difference between the two groups (p-value ≤ 0.05). The comparison of ovarian volume (>10 ml) between the two groups was also statistically significant (i.e. p-value ≤ 0.05).

Conclusion: It was concluded that out of the long list of biochemical test for diagnosis of PCOS in hirsute females only serum FSH, LH and progesterone are statistically significant. Patients who present with hirsutism should be evaluated systematically and initial investigations must not include a long list of endocrine test. Abdominopelvic USG for polycystic ovaries has a definite role in diagnosis and must be done at initial visit.

Key Words: hirsutism, polycystic ovaries, polycystic ovarian syndrome..

INTRODUCTION

Polycystic ovarian syndrome (PCOS) is a heterogeneous disorder and is first described by Stein and Leventhal in 1935[1]. It is one of the commonest endocrine disorders of women[2] and a frequent cause of hirsutism[3]. It affects 5-10% of women of reproductive age[4].

The diagnosis of PCOS remains controversial. It is recognized that a uniform characteristic of PCOS is hyperandrogenism[5] detected either by clinical examination or laboratory analysis. Other features fundamental to diagnosis include ovulatory dysfunction and polycystic ovarian morphology detected by ultrasonography (USG). Features not included in diagnostic criteria but have been reported to be present in PCOS patients are obesity (in 30-60% of patients[6, 7]), insulin resistance and hyperinsulinism (present in 50-70%) [8, 9], and an LH: FSH ratio of >2 or 3 (in 30-50%) [10, 11].

PCOS is a diagnosis of exclusion and other etiologies causing hirsutism or ovulatory disorders are to be excluded.

We conducted this study to evaluate the biochemical and ultrasonographic features of PCOS in patients with hirsutism and to compare these features with other etiologies of hirsutism in our setup.

MATERIALS AND METHODS

It was a comparative study performed between 1st September 2007 to 31st December 2008 in the department of Obstetrics and Gynecology FFH Rawalpindi.

All the female patients who presented to gynae and dermatology clinics with chief complaint of hirsutism were enrolled for the study after informed consent. A

detailed history including the onset and progression of hirsutism, menstrual history, dietary history and family history of hirsutism was taken. Clinical examination included an assessment of amount, distribution and severity of hirsutism by Ferriman-Gallwey scoring system[12]. It is a quantitative method of measuring hair growth which allows for the determination of severity of hirsutism by assessing the extent of hair growth in nine key anatomical sites i.e. face (particularly moustache, beard and temple areas), chest, linea alba, inner thigh, external genitalia, inner surface of upper arm, upper back, lower back and buttocks. A score of 7-9 was considered to represent mild hirsutism, 10-14 as moderate hirsutism and 15 or more as severe hirsutism.

Height, weight and a calculation of body mass index (BMI) was obtained because many women with PCOS are obese (BMI>30kg/m2). Breast examination for galactorrhoea and abdominopelvic examination to detect mass lesion that may indicate an androgen secreting ovarian tumor was also done. Endocrinological work up included day 2 serum follicle stimulating hormone(FSH), luteinizing hormone(LH) levels, serum prolactin, testosterone, estradiol, mid luteal progesterone, fasting insulin, dehydroe-piandrosterone(DHEAS), 17-hydroxyprogesterone, and thyroid function tests. All these tests were done free of cost in our laboratory. Abdominopelvic USG was done for adrenal tumors, ovarian tumors and polycystic ovaries. A total of three visits were done for this workup. The detailed history, clinical examination and results of all investigations were recorded in proformas for analysis later on.

The data was analyzed and etiology of hirsutism was ascertained. After excluding other etiologies of hirsutism, we labeled our patients as having PCOS using the criteria proposed by European Society for Human Reproduction and Embryology (ESHRE) and the American Society for Reproductive Medicine (ASRM) in 2003[13,14]. According to this criterion two out of the following three must be present to label the patient as PCOS: 1) oligomenorrhoea and or anovulation, 2) hyperandrogenism (clinical or biochemical) and 3) polycystic ovaries on ultrasonography (USG). Criteria for labeling PCOS on USG was an ovarian volume of more than or equal to 10 ml[15]. Clinical features of PCOS included menstrual irregularity, obesity, hirsutism[16, 17], BMI[18] more than or equal to 30kg/m^2. Biochemical criteria was high serum LH level with normal or low FSH, elevated testosterone level [19] and insulin resistance, evidenced by raised fasting insulin levels [16]. The patients who had normal ovulatory function and androgen levels were labelled as idiopathic.

We divided the patients into two groups, one labeled as PCOS group and the other control group including idiopathic hirsutism and other etiologies. Data was analyzed using STATA 11. Multivariant test and logit model was used for statistical analysis. *P*- value less than 0.05 was considered statistically significant i.e. all the statistical tests are conducted at 5% level of significance.

RESULTS

A total of 74 patients were included in the study, 44 had PCOS and 30 were in the control group with other etiologies of hirsutism including idiopathic, late onset CAH, hyperprolactinemia and thyroid disorders. We analyzed that mean age (Table I) and FG scoring (Table No.2) showed a statistically significant difference between the two groups while mean BMI (Table No.1), although slightly raised in PCOS group, but difference was not statistically significant at any significance level.

Regarding the biochemical tests, only serum FSH, LH and progesterone levels showed statistically significant difference between the two groups (p-value ≤ 0.05).

Table No.1: Demographic Variables of PCOS and Control group

Demographic Variables	PCOS (n=44) Mean (range)	Control (n=30) Mean (range)	p-value
Age	22.0 (15-42)	25.0 (13-46)	0.01
Body Mass Index	25.8 (1.6-36.9)	25.4 (16.8-39.8)	0.738

Table No.2: FG Scoring of PCOS and Control group

	PCOS (n=44) Mean (range)	Control (n=30) Mean (range)	p-value
FG Scoring	17.6 (6-32)	17.0 (8-31)	0.03

Table No.3: Biochemical features in PCOS and Control group

Hormones	PCOS (n=44) Mean (range)	Control (n=30) Mean (range)	p value
FSH (IU/L)	4.1 (1.07-26.4)	4.2 (1.1-10.6)	0.038
LH (IU/L)	11.49 (1.9-44)	3.7 (0.7-10)	0.001
Prolactin(mIU/ml)	331 (91-856)	349 (120-1540)	0.224
Oestradiol(pg/ml)	99.1 (0.005-419)	137 (0.05-500)	0.752
Basal insulin	16.5 (0.75-143)	9.6 (3.0-42)	0.342
Testosterone(ng/ml)	1.36 (0.1-7.8)	1.5 (0.03-14.4)	0.32
DHEAS(ug/dl)	185.6 (3.7-403)	230 (40.1-530)	0.456
Progesterone(ng/ml)	4.8 (0.1-37)	6.9 (1.0-37)	0.006

When we analyzed the ultrasonographic features, in PCOS group 22.7% of the patients have both ovaries enlarged (volume > 10ml) while in 29.6% either right or left ovary was enlarged. So overall in 52.3% patients of treatment group at least one ovary was enlarged while this overall number was only 20% in the control group. In control group, both ovaries were enlarged in 3.3% and single ovary was enlarged in 16.7% of the patients. This difference was statistically significant (p-value ≤ 0.05).

Table No.4: Ovarian Volume of PCOS and Control group

Ovarian Volume	PCOS (n=44	Control (n=30)	p-value
>10 ml (both ovaries	22.7%	3.3%	< 0.05
>10 ml (single ovary)	29.6%	16.7%	

DISCUSSION

Polycystic ovarian morphology is considered fundamental to diagnosis of PCOS. We used ASRM/ESHRE criteria i.e. ovarian volume > $10ml^3$ to label the patient as PCOS. More than 50% of our patients had either single or both ovaries enlarged (>10 ml^3) in PCOS group while in the control group only 20% had this finding. The difference was statistically significant. Ovarian volume of > 10 ml in PCOS patients is also quoted in other studies[20].

A number of biochemical tests have been reported for diagnosis of PCOS. These include serum FSH, LH, testosterone, oestradiol, progesterone, prolactin, fasting insulin and sex hormone binding globulin. In our study only serum FSH, LH and progesterone were (statistically) significantly different between two groups at 5% level of significance. An elevated serum LH >10 IU/L in early to midfollicular phase of cycle is commonly seen in patients with PCOS and is always included in diagnostic criteria[21]. An Italian study also quoted significantly raised LH level in PCOS group as compared to control[22]. Anovulation which is commonly seen in PCOS patients is confirmed by serum progesterone (<30 nmol/l) [21]. Our results showed that PCOS group had significantly lower levels of progesterone than the control group suggesting chronic anovulation associated with PCOS.

Regarding the serum testosterone level if it is < 5nmol/l, the diagnosis of PCOS or idiopathic hirsutism is made otherwise; other etiologies of hyperandrogenism should be sought[23]. In our study, none of such causes were seen so the difference between two groups regarding this biochemical test was not statistically significant. Dehydroepiandrosterone (DHEAS) and sex-hormone binding globulin (SHBG) are not routinely recommended in patients with PCOS[24]. Our study failed to find any significant difference in levels of DHEAS and SHBG in the two groups. This might be explained by the fact that measurement of biochemical androgens in PCOS is limited by poor accuracy and reproducibility of assays, which are designed for significantly higher male androgen levels.

It is also noteworthy that despite the role of insulin resistance hypothesis in PCOS, serum insulin level is not included in diagnostic criteria of PCOS[25]. Fasting insulin levels were also not significantly raised in PCOS patients in our study. One reason for this might be that obesity exacerbates the underlying insulin resistance in patients with PCOS and in our treatment group significant obesity was not observed.

Hyperprolactinemia is seen in 17-43% patients with PCOS in different studies[26, 27]. We were also not able to find significantly raised levels of serum prolactin in our patients.

The mean age in the PCOS group was 22.045years (range 15-42 years) and in the control group was 25.067 (range 13-46 years). The difference was statistically significant (*p-value* = 0.01). The mean FG scoring in PCOS and control group was 17.6 and 17.03 respectively showing statistically significant difference (*p-value* = 0.03). A recent Mexican study also showed statistically significant difference in FG scoring in PCOS and control group[28]. This finding is explained by the fact that patients with PCOS present with greater degree of hyperandrogenism than patients without PCOS.

Obesity is not always associated with PCOS, only 40-50% of patients with PCOS are obese[29]. The mean BMI in the PCOS group was 25.8 (range, 16.2-36.9) and in the control group was 25.4 (range, 16.8-39.8) that was not statistically significant. A study conducted in Iran also showed no significant difference in BMI between PCOS and control group[30].

CONCLUSION

It was concluded that out of the list of biochemical test for diagnosis of PCOS in hirsute females only serum FSH, LH and progesterone are statistically significant. Patients who present with hirsutism should be evaluated systematically and initial investigations must not include a long list of endocrine test. Abdominopelvic USG for polycystic ovaries has a definite role in diagnosis and must be done at initial visit.

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