CLINICAL AND ENDOCRINE FEATURES OF ULTRASOUND DIAGNOSED POLYCYSTIC OVARY PATIENTS: THE CORRELATION BETWEEN OVARIAN VOLUME AND ANDROGEN ACTIVITY

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ABSTRACT

One hundred and twenty five patients with polycystic ovaries on ultrasonography and 17 controls with normal ovaries on ultrasound and regular ovulary cycles underwent clinical and endocrine evaluation. Of 125 ultrasound-diagnosed polycystic ovary patients (PCO) 49.6% complained about hirsutism, 55.2% had menstrual disturbances (46A% oligomenorrhea, 8.8% amenorrhea), 23.2% had normal but irregular cycles and 50.4% had infertility. PCO patients had significantly higher mean serum LH, testosterone, androstenedione and DHEAS levels and higher mean ovarian volume compared with the control group. Sixty seven percent of PCO patients had enlarged ovaries and significantly higher mean serum LH, testosterone, androstenedione and DHEAS levels, compared with the PCO patients who had ovarian volume within normal range. There was a significant positive correlation between ovarian volume and serum LH, testosterone, androstenodione, DHEAS levels. Hirsutism, oligomenorrhea, irregular cycles were equally present in patients with normal ovarian volume and enlarged ovaries. These results illustrate the importance of ovarian volume measurement as an indicator of androgen production in PCO patients (JPMA 43: 4, 1993).

INTRODUCTION

Patients with the polycystic ovary syndrome (PCOS) typically have menstrual disturbances, obesity and hirsutism, hut recent clinical, cndocrine and ultrasound studies have emphasized the heterogeneous nature of the syndrome[1]. Ultrasonography of the ovaries has been a useful tool in confirming a clinical diagnosis of PCOS. The present study was done to investigate the clinical and endocrine features and ultrasonographic data of patients with polycystic ovaries confirmed on ultrasound and to evaluate the relationship between ovarian volume and these parameters.

PATIENTS AND METHODS

Pelvic ultrasonography was performed on all patients presenting to Reproductive Endocrinology and Infertility outpatient clinic for complaints of hirsutism, infertility and menstrual disturbances. A total of 125 patients with polycystic ovaries (PCO) (18 to 35 years) on ultrasound were included in the study and they underwent detailed clinical and endocrine evaluation. Seventeen controls with normal ovaries on ultrasound and regular ovulatory cycles were also studied simultaneous. The ovary was defined as polycystic according to the criteria of Adams et al2. All ultrasonographic examinations were performed by the same physician with a Combison 320-5 Kretz Technik. 5-7.5 transvaginal probe with 240° scanning angle used during sonographic examinations. Venous blood sampling were done simultaneously at the same day at 8 A.M. either in the early follicular phase (day 2-4) or between 6th and 8th days from the start of bleeding in cycling women or at random in ainenorrheic ones. The

ovarian volume was calculated as 1/2xd1xd2xd3 (d1 = maximal transverse diameter; d2 = maximal longitudinal diameter; d3 = maximal anteroposterior diameter) in the absence of a dominant follicle. The maximum cndomctrial thickness was measured directly. The menstrual history was defined as amenorrhea, oligomcnorrhea, regular (lasting atleast 21 days or at most 35 days, with no more than a 4-day variation in length between cycles in individual subjects) or irregular (cycle length between 21-35 days but more than a 4-day variation). The body mass index (BM1) represented the ratio of body weight (kg) and the square of the height (m). Radioimmunoassays (RIA) for serum estradiol (E2), follicle stimulating hormone (FSH), luteinizing hormone (LH), testosterone, androstcnedione and DHEAS were performed by standard techniques in our laboratory (Immuno Diagnostic Systems Limited, England; Diagnostic Products Corporation, USA; Diagnostic Systems Laboratories Inc., USA). Data analysis was performed using student's t-test, regression analysis and Fisher's extract test with the SPSS/PC programme, where appropriate. A p value of 0.05 or less was considered significant.

RESULTS

The age, BMI, ovarian size and endocrine parameters of 125 patients with PCO and controls are listed in Table I.

TABLE I. Endocrine and ultrasound data of 125 patients with PCO compared with the control group.

	PCO (n = 125)	Controls (n = 17)
Age (years)	24.8±0.83	25.5±0.7
BMI	26.9±1.08	26.7±2.1
FSH (IU/L)	6.64±0.57	5.65±1.27
LH (IU/L)	12.3±1.1*	4.8±0.34
E2 (pg/ml)	35.8±4.2	31.3±3.5
Testosterone (ng/dl)	101.8±6.4*	60.8±5.7
Androstenedione (ng/ml)	2.8±0.17*	1.8±0.2
DHEAS (ug/dl)	331±21.4*	213±15.6
Ovarian volume (cm^3)	12.3±0.7*	6.15±2.5

Values are mean±SEM
*p<0.05

PCO patients had significantly higher mean serum LU, testosterone and DHEAS levels and higher mean ovarian volume as compared to the controls. The presenting complaints of patients are listed in Table II.

TABLE II. Summary of presenting complaint in 125 patients with PCO.

	Normal ovarian volume (n = 41)		Increased ovarian volume (n = 84)		Total	
Hirsutism	19/41	(46.3%)	43/84	(51.2%)	65/125	(49.6%)
Oligomenorrhea	18/41	(43.9%	40/84	(47.6%)	58/125	(46.4%)
Amenorrhea	2/41	(4.9%)	9/84	(10.7%)	11/125	(8.8%)
Irregular cycles	8/41	(19.5%)	21/84	(25%)	29/125	(23.2%)
Infertility	23/41	(56.1%)	40/84	(47.6%)	63/125	(50.4%)

There was no significant difference in the frequency of hirsutism, infertility, oligomenorrhea, amenorrhea and irregular cycles. In control group, ovarian volumes ranged between 3.65 and 8.65 cm3 (mean 6.15±2.5). According to these data, 8.65 cm3 which represented mean±1SEM of the ovarian size in healthy women, has been accepted as a cut-off value for normal ovarian size in this study. Thirty three percent (41/125) of PCO patients had ovarian volume within normal range, while 67.2% (84/125) had enlarged ovaries.

TABLE III. Endocrine data from 125 PCO patients with normal ovarian volume and enlarged ovaries

	Normal volume (n = 41)	Increased ovarian volume (n = 84)
Age (years)	24.1±0.8	25.3±0.9
BMI	25.2±0.9	27.5±1.6
FSH (IU/L)	5.7±0.4	6.1±0.9
LH (IU/L)	9.4±1.1	16.2±1.4*
E2 (pg/ml)	22.6±4.2	28.9±3.1
Testosterone (ng/dl)	73.2±5.1	111.9±8.3**
Androstenedione (ng/ml)	1.87±0.05	3.3±0.31**
DHEAS (ug/dl)	273±22.1	368±30.1*

Values are mean±SEM
*p<0.05, **p=0.002

In Table III endocrine parameters of PCO patients with normal ovaries and enlarged ovaries are compared. PCO patients with enlarged ovaries had significantly higher mean serum LH, testosterone, androstenedione and DHEAS levels compared with the PCO patients who had ovarian volume within normal range. There was a significant positive correlation between ovarian volume and serum LH (r=0.56, p<0.05), testosterone (r =0.46, p <0.05), androstenedione (r=0.42, p< 0.05) and DI-IEAS levels (r=0.48, p<0.05).

DISCUSSION

As heterogenous clinical disorder, PCOS has an unclear pathophysiology. Abnormalities of the ovary,

adrenal gland and hypothalamic pituitary axis have been described. Although it is difficult to agree on a common definition, PCOS is characterized by chronic anovulation with evidence of hyperandrogenemia, which is usually perimenarchal in onset. Although all patients are hyperandrogenic (as shown by elevated blood levels of ovarian and/or adrenal androgens) they need not be hirsute. In the United States, 70% of all PCO patients have hirsutism as a complaint[3], while in Japan and the orient, a minority of patients (10-20%) complain about hirsutism[4]. In the present study hirsutism was present in 49.6% of PCO patients. Several reports have investigated the relationship between ovarian size and hormonal features of PCOS[1,5-9]. Hann et al[5] studied the ultrasonic appearance of 28 patients with PCOS. They found that 71% of the cases had bilaterally enlarged ovaries, which is close to our findings. It has been proposed that intensified follicular atresia and increased number of follicles in PCOS cause increased androgen production and, at the same time, are responsible for ovarian enlargement. The results of ovarian wedge resection, leading to a reduction of serum androgen levels, normalization of menstrual cycles and ovulation, supports our results that there is a relationship between androgen levels and the size of polycyctic ovaries. Conway and colleagues[1] reported larger ovaries in subgroups of PCO patients with either high testosterone or high LH levels and they also reported a positive correlation between serum testosterone concentrations and ovarian volume. In the study of Puzigaca et al[6], a positive correlation was found between serum androstenedione concentration and ovarian volume. In our study significant correlations were observed between serum LH, testosterone, androstenedione and DHEAS levels and ovarian volume. The results of this study showed the importance of measurement of ovarian volume as an indicator of androgen production in PCO patients, but, as in PCO patient, the source of androgen production might be the ovary and/or adrenal gland, the ovarian size can be normal whether the source is the ovary or the adrenal gland.

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