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Evaluation of Patients Identified with Polycystic Ovary Image on Ultrasonography

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ABSTRACT

The present study investigates the clinical, hormonal and biochemical differences between patients with polycystic ovary syndrome (PCOS), patients with polycystic ovary image (PCO-like) and a normal control group with no polycystic image syndrome.

Included in the study were 238 patients who presented to the Department of Obstetrics and Gynecology of Eskisehir Osmangazi University between December 2012 and December 2013 with complaints of infertility. A physical and pelvic examination of all patients was performed and their ovaries were evaluated with TVUS, and blood samples were taken for hormonal tests. The patients were categorized into three groups based on their clinical and endocrinological characteristics as: 77 cases with PCOS, 74 cases with PCO-like findings and 87 cases recruited as normal controls.

BMI and the rate of android obesity was found to be higher in patients with PCOS. Clinical and laboratory findings of hyperandrogenism were more commonly encountered in patients with PCOS. FG scores were found to be increased, and correlated with BMI, waist / hip ratio, free blood testosterone (fT) and total testosterone (TT) ($p<0.001$). AFC decreased in the control group with increased age ($p=0,003$) but no such association found in the PCOS ($p=0.216$) and PCO-like group ($p=0.876$).

Not every patient identified with a PCO image on ultrasonography has PCOS, and so clinical, hormonal and biochemical properties should be evaluated in detail when patients with PCO-like findings are encountered, and they should be differentiated from patients with PCOS. Patients with PCOS should be evaluated in detail and followed-up to prevent long-term complications.

Keywords: Polycystic ovary, polycystic ovary syndrome, ultrasonography

Introduction

PCOS has been defined as a multisystem reproductive-metabolic disease, and occurs in 4-12% of women of reproductive age as one of the most common reproductive endocrinopathies (1-3). The main clinical signs are hyperandrogenism, irregular menstruation and polycystic ovary morphology by ultrasound. Patients with any two of the three criteria on which consensus was established by the Rotterdam 2003 Polycystic Ovary Syndrome Study Group (oligomenorrhea, clinical hyperandrogenism and PCO image by ultrasonography [US] [12 or more antral follicles (AF) or increased ovarian volume, or the two together]) are diagnosed with PCOS (4). The mechanisms behind abnormalities in hypothalamic-hypophyseal-ovarian-adrenal functions in the etiology of PCOS are still unclear. Endocrine disorders such as congenital adrenal hyperplasia, androgen secreting tumors, Cushing syndrome, thyroid disorders and hyperprolactinoma should be excluded prior to a diagnosis of PCOS, since it is a multisystem disease with an unclear etiology.

PCOS and PCO image should be differentiated. PCO image has been determined in the range of 16–30% in young adult females in studies performed to date (5-7). Only some cases with a PCO morphology have PCOS. The incidence and distribution of clinical, biochemical and hormonal differences such as menstrual disorder, hyperandrogenism and obesity seen in patients with PCOS, is unknown in patients with a PCO morphology.

The aim of this study is to assess the clinical, hormonal and biochemical differences between patients with PCOS, patients with PCO-like and a normal control group with no polycystic image syndrome.

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Materials and methods

Included in the study were 238 patients aged 20–42 years who presented to the Department of Obstetrics and Gynecology of Eskisehir Osmangazi University between December 2012 and December 2013 with a complaint of infertility. The case - control study was approved with the decision of Eskişehir Osmangazi University Faculty of Medicine Ethics Committee dated 12 September 2012 and numbered 01. The patients were categorized into three groups based on their clinical and endocrinological characteristics and using the Rotterdam diagnostic criteria, resulting in 77 cases in the PCOS group, 74 cases with a PCO image on US but no clinical and biochemical hyperandrogenism in the PCO-like group, and 87 normo-ovulatory cases with no PCO image identified on US in the control group. A standard survey form was prepared based on findings in literature prior to the start of the study, including questions on factors that may be associated with PCOS.

The survey was applied to the patients at the time of presentation, and their blood pressure and waist and hip circumferences were measured. Systolic/diastolic blood pressure (BP) over 140/90 mmHg was accepted as hypertension. Body mass index (BMI) was calculated from the weight and height measurements of the patients [Body weight (kg)/height squared (m^2)], and BMI values above 25 kg/m^2 were accepted as overweight. The waist and hip circumferences of the patients were measured, and a waist/hip ratio of more than 0.85 was accepted as android obese. The waist and hip circumferences were measured while the patients were standing with their arms to their sides. The narrowest circumference between the chest wall and the two crista iliacas was measured as the waist circumference, while the largest circumference between the waist and thighs was measured as the hip circumference.

The patients underwent physical and pelvic examinations, and the presence of acne, alopecia (temporal hair loss and frontal baldness), hairing, fatty skin, android type obesity, brown color changes in the skin (acanthosis nigricans), scurf, "stria" in the abdomen or thin skin and galactorrhea were evaluated. The patients then underwent a transvaginal ultrasonography (TVUS) examination. The upper lip, chin, chest, back, upper arm, upper abdomen, lower abdomen and thighs were evaluated for hirsutism. Hirsutism was scored according to the Modified Ferriman Gallwey (FG) scoring system, in which each region is scored between 0 (no terminal hair growth) and 4 (maximal hair growth), with total scores of 8 and above being accepted as hirsutism. Serum fT and TT levels were assessed for laboratory diagnoses of hyperandrogenemia.

Follicle stimulating hormone (FSH), luteinizing hormone (LH), estradiol (E_2), thyroid stimulating hormone (TSH), fT, TT, fasting glucose and prolactin profile were assessed in all patients on the second or third days of the cycle.

Patients diagnosed with thyroid disease or hyperprolactinemia, and those who had used hormonal drugs, glucocorticoids, antiandrogens or antihypertensive drugs within the last 6 months were excluded from the study.

Laboratory Measurements: Blood samples were taken in the morning between 08:00–09:00 following 12 hours of fasting for all parameters (FSH, LH, E_2, TSH, fT, TT, fasting glucose and prolactin) and the tests were performed on the same day.

All of the hormonal tests were performed in the Department of Biochemistry of the School of Medicine of Eskisehir Osmangazi University. FSH, LH, E_2, TSH, prolactin and TT were studied using the electrochemiluminescence method; e-170 and fT using the immunoturbidimetric method; and glucose using the calorimetric enzymatic method and utilizing a Roche modular device.

A mean 15 ml of blood was drawn from the forearm for the hormone tests. The blood was centrifuged at 2500 rpm/min for 5 minutes and the sera were separated.

Statistical Analysis: The statistical analysis of the study findings was performed using IBM SPSS Statistics for Windows (Version 20.0. Armonk, NY: IBM Corp.), and all analyses were conducted in the Department of Biostatistics of the School of Medicine of Eskisehir Osmangazi University. Continuous variables were analyzed for normality with a Shapiro-Wilk test. A Kruskal Wallis Test was used for between-group comparisons since the variables were non-normally distributed. A Spearman Correlation analysis was used to determine any correlations between the variables. Median and percentile values (25%-75%) were presented as descriptive statistics. Categorical variables were analyzed with a Chi-square test, and were presented as numbers and percentage values. $p<0.05$ was accepted as statistically significant.

Results

The mean age was 26.97±3.94, 27.17±3.82 and 28.96±4.34 years in the PCOS, PCO-like and control groups, respectively. The weight, BMI, waist, hip and waist/hip ratio of the patients with PCOS were significantly higher than those in the control group ($p<0.001$). Among the patients with PCOS, 62% were obese, 19% were overweight and 19% had a normal BMI. Among those with android-type obesity (n=71), 56.3% had PCOS. No statistical difference was noted in the weight, BMI, waist, hip and waist/hip ratio of the patients in the PCOS-like and control groups. The systolic and diastolic BP of the patients with PCOS was found to be higher than in the PCO-like and control groups ($p<0.001$). Diastolic BP was found to be higher in the PCO-like cases when compared to the control group, while no statistical difference was found between the systolic BP of the control group and the PCO-like group ($p=0.118$). The number of days with no menstrual bleeding in the menstrual cycle of the patients with PCOS were significantly higher than in the PCO-like and control groups($p<0.001$). The number of days with menstrual bleeding during the menstrual cycle in the three groups were similar ($p=0.586$). Distribution of some clinical properties of the patients in the PCOS, PCO-like and control groups was presented in Table 1.

The FG score of the patients with PCOS was found to be significantly higher compared to the PCO-like and control groups ($p<0.001$). FG score was similar in the PCO-like and control groups ($p=0.270$). Hirsutism was found to be more common in the PCOS group compared to the remaining groups; however, no such association was found between the PCO-like and control group.

The antral follicle count (AFC) was found to be higher in the PCOS group compared to the PCO-like and control groups ($p<0.001$). AFC was found to be higher in the PCO-like group compared to the control group ($p<0.001$).

FSH levels of the patients in the control group was found to be higher compared to both the patients in the PCOS group ($p<0.001$) and also the patients in the PCO-like group ($p=0.022$); although FSH level was similar in the PCOS and PCO-like groups. The LH level in patients with PCOS was found to be significantly higher compared to the patients in the control group ($p<0.001$). LH level was similar in the PCO-like and control groups ($p=0.270$). LH/FSH ratio of the patients in the PCOS group was found to be higher compared to the patients in the PCO-like and the control groups. No difference was found in the LH/FSH ratio between the PCO-like and control groups ($p=0.460$).

The fasting glucose, TT and fT levels of the patients with PCOS was found to be significantly higher compared to the PCO-like and control groups ($p<0.001$). Fasting glucose ($p=0.637$) and TT ($p=0.608$) levels were similar in the PCO-like and control groups; however, fT level was found to be higher in the PCO-like group compared to the control group ($p=0.032$).

E2, TSH and prolactin levels were similar in the patient groups ($p=0.120$, $p=0.360$, $p=0.156$, respectively). The distribution of the laboratory and TVUS findings of the patients in the PCOS, PCO-like and control groups is presented in Table 2.

Positive correlations were found between FG score and BMI, waist/hip ratio, LH/FSH ratio, and E2, TT and fT levels when all cases included in the study were analyzed. These results revealed FG score to be increased with increased BMI, waist/hip ratio, LH/FSH ratio, E2, TT and fT levels ($p<0.001$). An analysis of the correlation between the FG score and other parameters in all cases included in the study (n=238) using a Pearson correlation analysis is presented in Table 3.

A negative correlation was identified between total AFC and age in the control group based on a Pearson correlation analysis involving all cases included in the study ($p=0.003$). In other words, the total AFC decreased in correlation with increased age in the control group, while no such correlation was noted in the PCOS and PCOS-like groups ($p=0.216$, $p=0.876$). A Pearson correlation analysis of total AFC and age in the PCOS, PCO-like and control groups is presented in Table 4.

A Pearson correlation analysis of all cases in the study revealed that the total AFC increased significantly with increased levels of BMI, waist/hip ratio, FG score, LH/FSH ratio, fasting glucose, TT and fT ($p<0.001$). An analysis of the correlation between the total AFC and other parameters in all cases included in the study (n=238) using Pearson correlation analysis is presented in Table 5.

Discussion

The present study has investigated the clinical, hormonal and biochemical differences between

Table 1. Distribution of clinical properties of the patients in the PCOS, PCO-like and control groups

	PCOS		PCO-like		Control		
Clinical Properties	Mean ± Standard Deviation	Median (%25 - %75)	Mean ± Standard Deviation	Median (%25 - %75)	Mean ± Standard Deviation	Median (%25 - %75)	Statistics
Age	26,97 ± 3,94	26 (24 – 29)	27,17 ± 3,82	26 (24 – 30)	28,96 ± 4,34	28 (26 – 31)	P=1,000
Height	1,61 ± 0,05	1,62 (1,58 - 1,65)	1,60 ± 0,06	1,60 (1,57 - 1,64)	1,61 ± 0,06	1,60 (1,57 - 1,65)	p=0,322
Weight	74,66 ± 13,89	73 (64 – 86)	63,18 ± 11,26	62 (55 – 70)	63,01 ± 11,87	64 (54 – 67)	p<0,.001†,Ψ p=1,000 Ω
BMI	28,50 ± 4,96	27,54 (23,87 – 33,05)	24,45 ± 3,60	23,94 (21,96 – 26,94)	24,16 ± 4,36	24,34 (20,79 – 26,66)	p<0,001†,Ψ p=1,000 Ω
Waist	91,31 ± 12,82	90 (80– 100)	80,93 ± 10,37	81 (74– 86)	79,79 ± 10,77	80 (70– 87)	p<0,001†,Ψ p=1,000 Ω
Hip	107,94 ± 10,36	105 (100 - 118)	102,32 ± 8,45	100 (95 - 110)	101,67 ± 9,52	102 (95 -110)	P=0,002† P=0,003Ψ p=1,000 Ω
Waist /Hip	0,84 ± 0,05	0,85 (0,80 - 0,87)	0,79 ± 0,06	0,78 (0,74 - 0,83)	0,78 ± 0,06	0,78 (0,72 - 0,82)	p<0,001†,Ψ p=1,000 Ω
Systolic BP	117,85 ± 8,44	120 (110 – 120)	106,62 ± 7,54	110 (100 – 110)	103,21 ± 8,48	100 (100 – 110)	p<0,001†,Ψ p=0,118 Ω
Diastolic BP	72,72 ± 7,23	70 (70 – 80)	66,01 ± 5,85	65 (60 – 70)	63,50 ± 5,86	60 (60 – 70)	p<0,001†,Ψ p=0,028 Ω
Number of Days with Menstrual Bleeding	5,37 ± 1,34	5 (4 – 6)	5,28 ± 1,06	5 (4 – 6)	5,11 ± 1,27	5 (4 – 6)	p=0,586
Number of Days with no Menstrual Bleeding	36,32 ± 14,52	35 (25 – 40)	23,75 ± 1,94	24 (23 – 25)	23,79 ± 2,85	24 (22 – 25)	p<0,001†,Ψ p=1,000 Ω
Total Number of Pads Used On Menstrual Days	9,66 ± 3,29	10 (8 – 12)	8,95 ± 1,93	10 (8 – 10)	8,66 ± 3,05	8 (7 – 10)	p=0,025 † p=0,355Ω p=0,919 Ψ

†: control ve PCOS, Ω: control ve PCO-like, Ψ: PCOS ve PCO-like
BMI: Body Mass Index
Systolic BP: Systolic blood pressure
Diastolic BP: Diastolik blood pressure

Table 2. Distribution of Laboratory and TVUS Findings of the Patients in the PCOS, PCO-like and Control Groups

	PCOS		PCO-like		Control		
Distribution of Laboratory and TVUS Findings	Mean ± Standard Deviation	Median (%25 - %75)	Mean ± Standard Deviation	Median (%25 - %75)	Mean ± Standard Deviation	Median (%25 - %75)	Statistics
FG Score	10,62 ± 4,49	10 (8 – 12)	4,32 ± 1,33	4 (3 – 6)	4,13 ± 2,39	4 (3 – 4)	p=0,270 Ω p<0,001†, Ψ
Total AFC	26,03 ± 3,67	26 (24 – 27)	23,33 ± 1,40	23 (22 – 24)	9,71 ± 2,93	9 (8 – 12)	p<0,001†, Ω, Ψ
FSH (m IU/mL)	5,54 ± 1,30	5,48 (4,62 – 6,29)	5,98 ± 1,37	5,79 (4,73 – 7,05)	6,92 ± 2,45	6,64 (5,65 – 7,52)	p=0,085 Ψ p<0,001† p=0,022 Ω
LH (m IU/mL)	9,23 ± 4,48	8,78 (6,66 – 10,60)	5,91 ± 2,04	5,72 (4,36 – 7,13)	5,86 ± 2,23	5,54 (4,42 – 6,88)	P=1,000Ω p<0,001†, Ψ
LH / FSH	1,73 ± 0,87	1,61 (1,15 – 2,05)	1,02 ± 0,45	0,97 (0,76 – 1,19)	0,89 ± 0,35	0,83 (0,67 – 1,17)	p=0,460 Ω p<0,001†, Ψ
E2 (pg ml)	50,68 ± 21,44	46,25 (38,19 – 54,50)	43,56 ± 15,32	42,83 (34,48 – 52,62)	50,09 ± 18,39	44,25 (35,10 – 66,01)	p=0,120
TSH(uIU/ml)	2,35 ± 1,07	2,02 (1,62 – 2,77)	2,61 ± 2,85	1,81 (1,41 – 2,61)	2,15 ± 0,99	2,24 (1,44 – 2,78)	p=0,360
Fasting glucose(mg/dL)	91,18 ± 20,50	89 (85– 92)	86,09 ± 5,40	85 (82– 89)	84,75 ± 4,46	85 (81– 88)	p=0,637 Ω p<0,001† p=0,001Ψ
Prolactin (ng/ml)	16,13 ± 7,51	15,17 (11,61 – 18,76)	18,33 ± 9,19	17,46 (12,37 – 22,58)	15,94 ± 4,94	15,45 (12,70 – 18,55)	p=0,156
TT (ng/dL)	37,46 ± 22,68	32,24 (25,56 – 36,75)	23,24 ± 7,99	24,35 (17,43 – 28,25)	21,92 ± 8,98	19,42 (18,44 – 24,80)	p=0,608 Ω p<0,001†, Ψ
fT (pg/mL)	3,25 ± 2,05	2,89 (2,24 – 3,80)	1,63 ± 0,68	1,59 (1,20 – 1,98)	1,45 ± 1,37	1,20 (0,93 – 1,55)	p=0,032 Ω p<0,001†, Ψ

†:control ve PCOS, Ω:control ve PCO-like, Ψ:PCOS ve PCO-like
TVUS:Transvaginal ultrasonography
FG Score:Ferriman Gallwey Score
Total AFC:Total Antral Follicle Count
TT:Total Testosterone
fT:Free Testosterone

patients with PCOS, PCO-like patients and a non-PCO-like normal control group.

The mean BMI was 28.5 kg/m², 24.45 kg/m² and 24.16 kg/m² in the PCOS, PCO-like and control groups. There was no difference in the BMI's of the PCOS and control groups in a study conducted in India, concurring with the findings of the present study and many other studies published to date (8). Uçkan et al. reported a higher BMI in patients with PCOS when compared to the controls in a study in Turkey (9). Baldini et al. study in Croatia reported the

Table 3: Comparison of FG Score and other Parameters in all Cases Included in the Study (n=238) through a Pearson Correlation Analysis

Parameter	r	p	
BMI	0,330	p<0,001	Positive relationship
Waist/ hip ratio	0,317	p<0,001	Positive relationship
LH / FSH ratio	0,426	p<0,001	Positive relationship
E2	0,148	p=0,023	Positive relationship
TT	0,542	p<0,001	Positive relationship
fT	0,657	p<0,001	Positive relationship

* Pearson (two-tailed) correlation analysis p<0.05
FG score: Ferriman Gallwey Score
BMI:Body Mass Index
TT:Total Testosterone
fT:Free Testosterone

Table 4. Pearson Correlation Analysis of AFC and age in the PCOS, PCO-Like and Control Groups

Parameter	r	p	
PCOS	-0,143	p=0,216	Negative relationship
PCO-like	-0,018	p=0,876	Negative relationship
Control	-0,317	p=0,003	Positive relationship

* Pearson (two-tailed) correlation analysis p<0.05
AFC: Antral Follicle Count

Table 5. Comparison of AFC and other parameters in all cases included in the study (n=238) through a Pearson Correlation Analysis

Parameter	r	p	
BMI	0,327	p<0,001	Positive relationship
Waist/ hip ratio	0,373	p<0,001	Positive relationship
FG Score	0,597	p<0,001	Positive relationship
LH / FSH rate	0,424	p<0,001	Positive relationship
Fasting Glucose	0,282	p<0,001	Positive relationship
TT	0,375	p<0,001	Positive relationship
fT	0,504	p<0,001	Positive relationship

* Pearson (two-tailed) correlation analysis p<0.05
AFC: Antral Follicle Count
BMI:Body Mass Index
FG score: Ferriman Gallwey Score
TT:Total Testosterone
fT:Free Testosterone

BMI of patients with PCOS to be higher than that of the control group in their study (10).

Android-type fat distribution refers to cases in which the waist/hip ratio is above 0.85. The waist/hip ratio was 0.84, 0.79 and 0.78 in the PCOS, PCOS-like, and control groups, respectively. In the present study, android obesity was diagnosed in 51.9% of the patients with PCOS, being more common among the patients with PCOS than those in the other groups. Faria et al. reported no difference in the anthropometric parameters of patients with PCOS and a control group in a study of 485 adolescents (11). Furthermore, a study in Iran of 1549 women and a study by De Souza et al both reported higher waist circumference, waist/hip ratio and BMI in patients with PCOS when compared to the control group (12-13).

Hirsutism is the most important clinical finding of hyperandrogenism, and is most commonly evaluated using the FG scoring method, although it is a quite subjective approach. The same

researcher obtained the anamnesis, and carried out the physical and ultrasonographic examinations to prevent a possible bias. The FG score identified during the physical examination in the study group was found to be higher in patients with PCOS than in the PCO-like and control groups. Hirsutism is seen more frequently in cases with PCOS, and the hirsutism rate, measured using the FG system, was found to be 57% in a meta-analysis of 16 studies involving a total of 5,647 patients with PCOS (14). Baldini et al. identified hirsutism in 75% of patients with PCOS in their study (10), while Ugwo et al. identified hirsutism in 30.6% of patients with PCOS (15). The mean FG score was found to be 11.2 and 5.5 in patients with PCOS and in the control group, respectively, in a study performed in Turkey with 43 patients with PCOS and 75 patients in the control group, hirsutism was reported to be more common in patients with PCOS (16).

A PCO-like condition is among the Rotterdam diagnostic criteria for PCOS (4). Only some patients with a PCO morphology, with only one of oligomenorrhea or with clinical hyperandrogenism findings have appropriate properties for the emergence of PCOS. Around 16–30% of young adult women have been reported with PCO-like conditions in studies in literature (5-7). PCO-like conditions have been determined in 94.2% of 719 patients with PCOS, 97.7% of 300 patients with PCOS, 86.8% of 410 patients with PCOS in some selected studies in literature (17-19). All patients with PCOS had a PCO-like condition in the present study.

The LH levels and LH/FSH ratios of the patients in the PCOS group were found to be higher than in those in the PCO-like and control groups. Furthermore, the LH/FSH ratio was found to be above two in 27% of patients with PCOS. In another study, the LH/FSH ratio was reported to be above two in 45.2% of patients including 62 infertile PCOS cases (15), and the LH/FSH ratio was found to be higher in patients with PCOS than in a control group in a study in China of 719 patients with PCOS and 685 patients in a control group (17).

Fasting glucose levels were found to be higher in patients with PCOS than in those in the PCO-like and control groups in the present study. Diabetes mellitus is an important complication in PCOS that may develop in the long-term, as impaired fasting glucose levels in younger ages are known to increase the risk of diabetes in later years. No statistical difference was found in the fasting glucose levels of the control group and the PCOS group in a study conducted in Croatia (10). Impaired fasting glucose levels were noted in 25% of the patients in a study of 226 anovulatory patients with PCOS (20), and the ratio of patients with a fasting glucose level of 100–125 mg/dl was found to be 5.2% in a study of 671 patients with PCOS (21).

Serum fT and TT levels are markers of hyperandrogenism, which is one of the diagnostic criteria of PCOS, and were found to be high in patients with PCOS in the present study. Conway et al., Legro et al. and Hahn et al. reported high TT levels in 22.3% of 556 PCOS cases, 60.8% of 626 cases, and 81% of 200 cases, respectively (22-24). Furthermore, high TT was reported to be present in 37% of cases in a meta-analysis of six studies involving 3,464 cases with PCOS (14).

The total FG score, and thus the rate of hirsutism, was found to increase in the present study with increases in BMI, waist/hip ratio, LH/FSH ratio, and E2, TT and fT levels. Rehme et al. reported higher total FG score, waist circumference and blood TT values in patients with high BMI when compared to those with a normal BMI in their study of 60 patients with PCOS and 70 control cases (25). Hirsutism was found to be more frequent in the obese group in a study of 25 obese and 66 non-obese PCOS cases (26). No statistically significant correlation was found between BMI and total FG score or blood TT in a study by Coskun et al. in Turkey (16).

Total AFC was found to decrease with increased age in the control group in the present study, while no decrease in AFC was noted with increased age in the PCOS and PCOS-like groups. Wiser et al. reported a statistically significant decrease in annual follicle loss in their PCOS group when compared to the control group in their retrospective 4-year study of 619 patients with PCOS and 4,337 controls (27). The mean follicle loss was reported to be 0.8 follicles/year and 1.7 follicles/year in the PCOS and control groups, respectively. A linear AFC decrease by age was found in a study of 362 normo ovulatory patients (28).

Not every patient with a PCO image on ultrasonography has PCOS, and so clinical, hormonal and biochemical properties should be evaluated in detail when patients with PCO-like findings are analyzed, and they should be differentiated from patients with PCOS. PCOS can manifest in a large spectrum of clinical and laboratory findings, meaning that patients should be evaluated in depth. Patients who have not been definitively diagnosed but that are considered high

risk should be closely followed-up. A detailed evaluation and close follow-up may prevent the serious long-term complications associated with PCOS, such as infertility, metabolic syndrome, vascular disease and cancer and morbidities.

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