

Prevalence and ultrasound features of polycystic ovaries in Kerbala, Iraq

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Objective The prevalence of polycystic ovary (PCO) is still greatly unidentified in our country so this study presents the prevalence and ultrasound of PCO.

Methods This prospective study which was studied in 106 women with age ranging between 18 and 47 years old had been enrolled outpatient clinic from February 2016 to August 2017 presenting with menstrual abnormality or infertility, ethically permission was taken from them for ultrasonography.

Results The accepted ultrasound features of PCO is the existence of 12 or higher number of follicles in ovaries with size measured ranging between 2 and 9 mm was 88 from 106 females; volume of ovary measured higher than 10 cm³ was 80 from those 106 females; a distribution of follicles in ovary seen to be peripherally arranged was 78 (73.6%) and increase echogenicity and thickness of ovarian stroma was 63 (59.4%).

Conclusion The study result that the highest sensitivity criteria in establishing the diagnosis of PCO is the presence of 12 follicles in ovary or higher number of follicles with size measured ranging between 2 and 9 mm.

Keywords polycystic changes of ovary, ultrasound, ovarian follicle, polycystic ovarian syndrome

Introduction

Polycystic ovarian syndrome (PCOS) is a disturbance of ovarian function with increase production of androgens hormone had been described with cardinal features of androgen hormone excess and polycystic changes of ovaries which seen in ultrasonography was firstly distinguished in 1935 by Stein and Leventhal.^{1,2}

In child bearing age women PCOS is recognized as the more familiar endocrine disorder which contributed to be due to a combination of genetic and environmental factors.³⁻⁵ The main risk factors for PCO include obesity, sedentary life style, and family history.⁶

In 2003 the European Society of Human Reproduction (in Rotterdam) and the American Society of Reproductive Medicine proposed that the diagnosis depended on the presence of any two of three from these following criteria: oligomenorrhea or amenorrhea, clinical features or/and biochemical sign, and ultrasound features that demonstrated polycystic changes in ovaries; provided that other causes should be rule out.⁷

No individual diagnostic feature is enough for taking the decision to diagnosed polycystic ovarian syndrome in clinical practice as it is considered a syndrome. So the diagnosis of PCO had been made by ruling out of other disorders which were clinically similar to PCOS; like Cushing syndrome, congenitally inherited hyperplasia of adrenal gland, and virilising tumors.⁸

Although the approach of ultrasound, had been described many diagnostic criteria of PCO morphology, but still no harmony to their respective diagnostic value.⁹

The study aims to report prevalence of PCO in women with an overview of the salient ultrasound features of PCO.

Materials and Methods

A total of 106 women included in this cross-sectional study with mean age of 25.8 ± 5.9 SD (ranging between 18 and 47 years old) had been enrolled outpatient clinic from

February 2016 to August 2017 complaining from menstrual abnormality or infertility, abdominal and transvaginal ultrasonography had been done for them between cycle days 2 and 7 or during any day of amenorrhea using a 5.5 MHz curved-array scanner of transabdominal transducer and scanning transvaginally using a transducer with frequency of 6.5 MHz, ethically permission had been taken from all women attended radiology clinic for taking her data for research purpose. Ultrasound examination had been done by Siemens Sonoline G60S model No.: 1P 7475101, date of manufacture in December 2003, made in Italy for Siemens Medical Solutions, Inc., Issaquah, WA, USA. The result has been tested by SPSS 22.

Results

The study included 106 women mean age of 25.8 ± 5.9 SD (ranging between 18 and 47 years old) 24 (22.6%) women of them with hirsutism, 16 (15.1 %) with acne, 25 (23.6%) with acne and hirsutism, 92 (86.8%) of all women in the study with oligomenorrhea while 14 (13.2%) of them with amenorrhea, 76 (71.7%) of 106 women with infertility, only two of all women has hypothyroidism as demonstrated in [Table 1](#).

Features of PCO for all women included in the study were mean ovarian volume (11.6 ± 2.6 and 11.1 ± 2.3) for right and left ovary respectively and number of follicles per right and left ovary were (14.9 ± 3.4, 14.2 ± 2.8) respectively as shown in [Table 2](#).

The distribution of women according to criteria of PCO as they had been demonstrated by ultrasonography were 80 of them with ovarian volume >9 cm³, 88 of 106 women with follicular number 12 or more, 63 (59.4%) of total number of women with highly echogenic ovarian stroma while 78 (73.6%) of them with peripheral distribution of follicles as demonstrated in [Fig. 1](#).

The ultrasound images from two patients with PCO are displayed in [Figs. 2 and 3](#).

Table 1. **Clinical and menstrual abnormalities in patients with PCO (N = 106)**

Feature	No. (%)
Age (years)	25.8 ± 5.9
Patients with hirsutism	24 (22.6)
Patients with acne	16 (15.1)
Patients with hirsutism and acne	25 (23.6)
Patients with oligomenorrhea	92 (86.8)
Patients with amenorrhea	14 (13.2)
Hypothyroidism	2 (1.9)
Infertility	76 (71.7)

Table 2. **Features of PCO in ultrasonography**

Diagnostic criteria of PCO	Mean ± SD
Volume of RT ovary	11.6 ± 2.6
Volume of LT ovary	11.1 ± 2.3
Follicle no. per RT ovary	14.9 ± 3.4
Follicle no. per LT ovary	14.2 ± 2.8

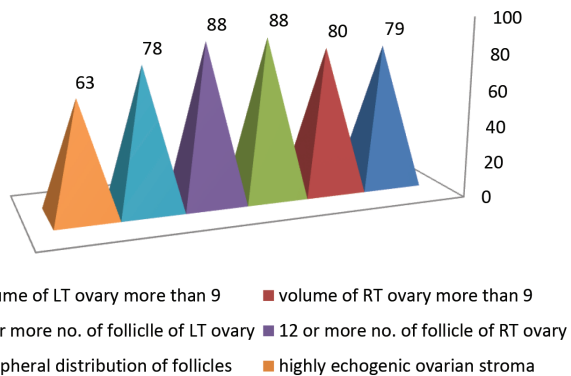


Fig. 1 **The distribution of ultrasonographic criteria of PCO.**

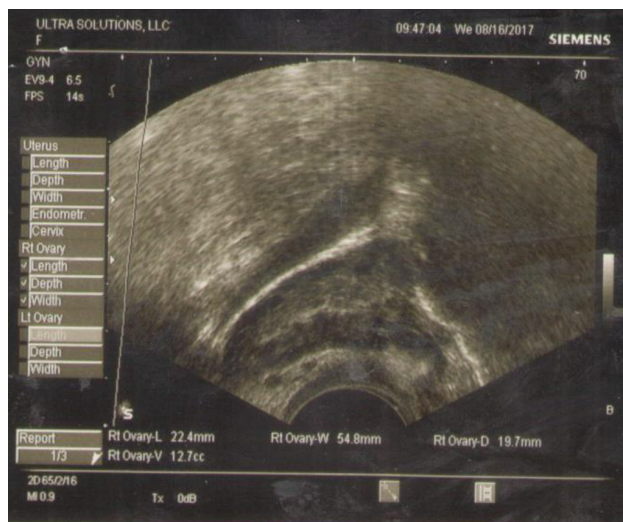


Fig. 2 **Transvaginal scan of right ovary (25-year-old woman) showing >12 peripherally distributed follicles all measuring between 2 and 4 mm in diameter with echogenic central ovarian stroma.**

Discussion

March et al.¹² organize a cohort study (retrospective study) in whom 728 female with (age one-fourth 27–34 years) were traced and interviewed, they described an ideal prevalence that evaluate PCO in the society follow the criteria of the National Institutes of Health (NIH) and the advance criteria of Rotterdam and Androgen Excess Society (AES). By using the criteria of NIH they predicted that the prevalence of PCO was 8.7 + 2.0% (no imputation was needed), when compared with prevalence using the criteria of Rotterdam it was seen to be 11.9 + 2.4% which had been demonstrated to increase to 17.8 + 2.8% with the addition of an imputed data. The prevalence of PCO had been recorded as 10.2 + 2.2% following the AES suggestion which increase to 12.0 + 2.4% when imputed data was added. In this study, the estimated prevalence was which is greatly higher than the previous data. The high incidence of obesity in our country which has an established association



Fig. 3 **Transvaginal scan of both ovaries (26 years old) showing >12 peripherally distributed follicles all measuring between 2 and 5 mm in diameter with echogenic central ovarian stroma.**

with PCOS may be one of the explanations for this high prevalence. A study conducted on 29–43-year-old Saudi females patients with suggested diagnosis of PCOS illustrated the prevalence of 64.5% obese and 24.2% overweight cases.¹³ Furthermore, other investigators have described a high prevalence of obesity with infertility and PCOS.^{14–16}

To make a diagnosis of PCOS there was a correlation which established on combination of one criteria from the following clinical criteria which include: hirsutism (with score of >8 according to the modified Ferriman and Gallwey)¹⁷ or a disturbances of menstrual cycle (irregular cycle; oligomenorrhea or amenorrhea), associated with abnormalities of one of the biological criteria (the levels of luteinizing hormone in serum measured >6.5 UI/l, and/or the levels of testosterone measured >0.7 ng/ml, and/or the levels of androstenedione which was higher than 2.2 ng/ml), or unilateral or bilateral volume of ovaries higher than 10 cm² measuring by ultrasound.^{18,19}

For the purpose of comparison, the prevalence of hirsutism demonstrated with PCO in this study (was 24%) which was seen to be lower than a Greek study that show the prevalence which was 29%²⁰ and the other three PCOS prevalence studies.^{21–23} The hirsutism prevalence higher in other studies may be due to a reflection of alternate methodologies and selection criteria which was used for the definition of hirsutism.

The role of ultrasound study in pelvic cavity is essential for the demonstration of changes which occur in ovaries in syndrome of PCO and it also play an important role in detecting sexual development abnormalities and androgens producing ovarian tumors.²⁴ To make diagnosis of polycystic changes of ovary using ultrasound there were criteria such as the demonstration of 12 follicles or more in ovaries with diameter measuring between 2 and 9 mm or increase in ovarian volume for higher than 10 cm³ at least seen in only one ovary. If there is one follicle with size >10 mm in its widest diameter so the ultrasound should be repeated later for more correct calculation of the area and volume of ovaries.

A classical ultrasound features of PCOS are the arrangement of follicles in periphery of ovaries giving the appearance of “string of pearls” and increase echogenicity of ovarian stroma.²⁵ Hormonal contraception must be avoided when the ultrasound and hormonal study was carried out.

In this subject, the most sensitive clue for ultrasonography features of PCO had seen to be the numbers of follicles which found twelve follicles or more of size ranging between 2 and 9 mm which is seen in 88% cases. This high number of follicles in cases of PCO had been proved the follicular arrest theory, which proposes that in cases of PCO the growth of small ovarian follicles to reach the size of 6 ± 9 mm and so to become the dominant follicle cannot occur in normal pattern²⁶ which was very important thing in evaluation anovulation which had been occur in PCO, and it shown to be occur more in females which have high blood level of insulin and also seen more in obese women. As ultrasound able to detect follicles size >2 mm, the multiple count of follicles which seen in ovaries in cases of PCO may lead to misdiagnosis with other

etiologies that cause these large number of follicles in ovaries in whom only the final stages of follicular growing with size of follicles >4 mm are included. In many pathological and physiological disorder this nature of vary with multiple follicles counts which was demonstrated by ultrasound like in cases of increase prolactin hormone levels, delayed puberty, hypothalamic anovulation, central precocious puberty.¹⁹ So the question of which the accepted follicles count threshold in ovaries is considered for the diagnosis of PCO.

In a clinical practice evaluation size of ovaries has been seen to be an ideal alternate for measurement of the volume of stroma.²⁷ In females using oral contraceptives this definition was not been used, hence the contraception change the morphology of ovaries in normal women and particularly in case of PCO.²⁸

Transvaginal scanning is better than transabdominal ultrasound because of good resolution, and because transvaginal scanning performed without need for full bladder so the females preferred it which regarded more comfortable to the patients and also less time losing.²⁷ Transvaginal route must be used wherever possible mainly in obese women.²⁹ When ultrasound scanning performed transvaginally we use probes with frequency >6.5 MHz, which give a good spatial resolution so it can be performed with better results. The recent entrance of color- and pulsed-Doppler ultrasound and the ultrasound with three-dimensional scanning which also aid in the evaluations of polycystic ovaries, which had been commonly utilized in time.³⁰

Study Limitations

A volunteers who participated in the study may cause a referral bias. The small size of women sample is regarded as another study limitation which can alter the numerical strength of the study cohort.

Conclusion

The analysis of the stroma of ovaries quantitatively and the objectivity of observations has been largely improved by ultrasound diagnostic criteria of PCO. The diagnostic accuracy had been advance from the only demonstration of ovarian size to the evaluations the characteristic patterns of follicles distribution and also to the changes in the ovarian stroma textures with each successive and continuous refinement in the deal of technology. The presence of 12 or more 2–9 mm follicles observe appears to be good and sensitive indicator than the ovarian volume or brightness of ovarian stroma.

Conflict of Interest

None. ■

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