Original Article

Diagnostic Accuracy of Transabdominal Versus Transvaginal Sonography in the Detection of Polycystic Ovaries Taking Transvaginal Sonography as Gold Standard in Islamabad Population

Arifah Tayyaba Jamil[1], Syed Amir Gilani[2], Sajid Shaheen Malik[3], Raham Bacha[4], Sanam Yasir[5]

[1]Student of MS Ultrasound, The University of Lahore, [2]Dean FAHS, University of Lahore
[3]HOD, UIRSMIT, FAHS, The University of Lahore, [4]Senior Lecturer Department (UIRSMIT) FAHS University of Lahore, [5]Assistant Professor, Shifa International Hospital Islamabad

Correspondence: *Arifah Tayyaba Jamil*
Student of MS Ultrasound, The University of Lahore
Senior Sonologist Shifa International Hospital
arifahjamil@gmail.com

Abstract

Objective: The objective of the study is to determine the validity of transabdominal ultrasound in the detection of polycystic ovaries using transvaginal ultrasound as a gold standard.

Methodology: Study was conducted after the approval from board of studies from September 2017 to February 2018. A written informed consent was taken from the patients or their guardians. Patient's identification and details was not published. The Study design was correlation study. The study was conducted at Shifa International Hospital. Non probability sampling procedure was done. The sample collected from accessible population who were referred through OPD (outpatient department) with a single or group of symptoms like menstrual irregularities (Oligomenorrhea /Amenorrhea), infertility, recurrent loss of pregnancies, hirsuitism, acne vulgaris, and obesity.

Results: Total 50 participants completed our questionnaire. The mean (SD) age of the study participant was 29 (5) years. In our study mean (SD) number of parity was1.34 (1.06). The mean (SD) Right ovarian volume via TAS and TVS was 13.2 (4.5) and 13.4 (5.0) respectively. Similarly, mean (SD) left ovarian volume via TAS and TVS was 11.9 (3.5) and 12.6 (3.6) respectively.

Conclusion: It is evident form this study that transabdominal ultrasound gives us very much satisfactory and reliable results in detection of polycystic ovaries.

Key words: Transabdominal versus transvaginal sonography. Polycystic Ovaries.

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Introduction

Polycystic ovarian disease or syndrome is described as a heterogeneous disorder of females in their reproductive age in which the normal process leading to ovulation is disrupted. It is characterized by hyperandrogenemia, normal or increased levels of estrogens and elevated Luteinizing Hormone (LH) secretion with a higher LH to Follicle Stimulating Hormone (FSH) ratio. Patients generally present with

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symptoms of menstrual disorder (oligomenorrhea or amenorrhea), infertility, recurrent pregnancy losses, hirsuitism, obesity, and acne vulgaris.[1]

Ultrasonography is a very simple, cost effective and sensitive diagnostic study for polycystic ovaries. The ultrasonographic criteria for establishing the polycystic ovary is an ovary with a volume of more than 7.5 ml with more than seven, 2-5 mm follicles peripherally distributed and the ovarian stroma is increased. The uterus may be enlarged or normal with thick endometrium. Both transabdominal and transvaginal ultrasonography can be used as imaging procedures.[2]

In transabdominal ultrasound uterus and ovaries are visualized by using the transducer of 3-4 MH through an acoustic window provided by full urinary bladder. In transvaginal ultrasonography transducer of 5-7 MH is used and the urinary bladder is empty, the transducer is closer to ovaries, uterus and other pelvic structures. Transabdominal ultrasound is sensitive to recognize a follicle less than 1cm in the ovary whereas high resolution of transvaginal ultrasound enables us to visualize a follicle of even 5mm in an ovary very easily. Thus, transvaginal ultrasound because of its high resolution is considered more accurate than transabdominal ultrasonography in detecting polycystic ovaries and at present it is considered as gold standard. Although transvaginal ultrasound is very useful in detecting polycystic ovaries there are certain condition where it is difficult to perform, like in scarring and tenderness in vagina, if the patient has not had intercourse before or the setups where the facility is not available. However, in these conditions we can perform transabdominal ultrasound easily, it is readily available in most of the setups and is cheaper. As with this study it is proved that transabdominal ultrasound is as reliable as transvaginal ultrasound in detection of polycystic ovaries, the patient can be with a simple and economical alternative to transvaginal ultrasound.[3]

A study conducted by Mujeeb S et al at Agha Khan university the sensitivity of ultrasound in detection of PCO was 87.7% and specificity was 99% which is very much comparable with the results of this study.

Methodology

The study was conducted after the approval from board of studies from September 2017 to February 2018. Written informed consent was taken from the patients or their guardians. Patient's identification and details was not published. The Study design was correlation study. The study was conducted at Shifa International Hospital. Non probability sampling procedure was done. The duration of study was six months after approval of synopsis. Islamabad population was the targeted population and the sample collected from accessible population. Inclusion criteria, patients who were referred through OPD (outpatient department) with a single or group of symptoms like menstrual irregularities (Oligomenorrhea /Amenorrhea), infertility, and recurrent loss of pregnancies, hirsuitism, acne vulgaris, and obesity were selected**.** Exclusion criteria, patients with other than above mentioned complaints sampling procedure, fifty convenient females with complaints of irregular cycle and infertility

As compared with other studies conducted internationally the mean age is almost the same with + 2 to 3 years. The mean presenting weight of the females was 64.57 kg with standard deviation of 6.33. The minimum weight was 49.00 kg and the maximum weight was 82.00 kg. Thus, transabdominal ultrasound was able to detect most of the cases with polycystic ovaries correctly except in those in which the disease was at a very initial stage. In our study 50 females from Islamabad population were studied, which presented with a single or group of symptoms of polycystic ovary syndrome. These 50 females had their transabdominal ultrasound done for the presence or absence of polycystic ovaries and then findings were compared with the final diagnosis of transvaginal ultrasound. The mean (SD) Right ovarian volume via TAS and TVS was 13.2 (4.5) and 13.4 (5.0) respectively. Similarly, mean (SD) left ovarian volume via TAS and TVS was 11.9 (3.5) and 12.6 (3.6) respectively. Majority of the study participants (58%) were between 25 – 30 years old. Over 40% of the participants had a history of infertility. There were 38% participants who had irregular cycles. Only 2% of the participants reported PCOD. Only 2% of the participants had 4 children. Under one third (30%) of the participants had either one or two children. Just above (26%) participant didn't have any children in this study. We didn't find any significant difference

TASROV and TVSROV. Also, we didn't find any significant difference TASLOV and TVSLOV in our study.

Results

Total 50 participants completed our questionnaire. The mean (SD) age of the study participant was 29 (5) years. In our study mean (SD) number of parity was1.34 (1.06).

Table I: Descriptive Statistics

	Mean + SD
Age	29.40 + 5.07
Age Group	2.30 + 0.84
Relevant complaints	2.80 + 1.63
Parity	1.34 + 1.06
Transabdominal sonography right ovarian volume	13.24 + 4.47
Transvaginal sonography right ovarian volume	13.40 + 5.01
Transabdominal sonography left ovarian volume	11.90 + 3.54
Transvaginal sonography left ovarian volume	12.55 + 3.57

RC: Relevant complaints, TASROV: Transabdominal right ovarian volume, TVSROV: Transvaginal right ovarian volume, TASLOV: transabdominal left ovarian volume, TVSLOV: Transvaginal left the ovarian volume

The mean (SD) Right ovarian volume via TAS and TVS was 13.2 (4.5) and 13.4 (5.0) respectively. Similarly, mean (SD) left ovarian volume via TAS and TVS was 11.9 (3.5) and 12.6 (3.6) respectively.

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We didn't find any significant difference between TASROV and TVSROV. Also, we didn't find any significant difference TASLOV and TVSLOV in our study.

Table II: Frequency of age group

	Frequency	%
Age group	**50**	**100**
<25	6	12.0
25-30	29	58.0
31-35	9	18.0
>35	6	12.0
Relevant complaints	**50**	**100**
Infertility	21	42
PCOD	1	2,0
Irregular cycle	19	38.0
Amenorrhea	7	14.0
Parity	**50**	**100**
.00	13	26.0
1.00	15	30.0
2.00	15	30.0
3.00	6	12.0
4.00	1	2.0

Table III: Paired samples statistics.

		Mean + SD
Pair 1	Transabdominal sonography right ovarian volume	13.24 + 4.47
	Transvaginal sonography right ovarian volume	13.40 + 5.01
Pair 2	Transabdominal sonography left ovarian volume	11.90 + 3.54
	Transvaginal sonography left ovarian volume	12.55 + 3.57

Table IV: Paired samples correlations

	N	Correlation
Tasrov & Tvsrov	50	.524
Taslov & Tvslov	50	.741

Table V: Paired samples test.

	Paired Differences			
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower
Tasrov - Tvsrov	-.15600	4.65220	.65792	-1.47814
Taslov - Tvslov	-.65000	2.55999	.36204	-1.37754

Table-VI: Paired samples test

		Paired Differences			
		95% Confidence Interval of the Difference			
		Upper	t	df	Sig. (2-tailed)
Pair 1	Tasrov - Tvsrov	1.16	-.23	49	.81
Pair 2	Taslov - Tvslov	.07	-1.79	49	.07

Discussion

Polycystic ovary disease or syndrome is a complex disorder which a female suffers in her childbearing age 60. In this condition the patient has imbalance between hormones secreted from hypothalamus, pituitary gland, and the ovaries.[4] This results in anovulatory cycles and other significant reproductive and nonreproductive morbidities. The patient presents with a single or group of symptoms like oligomenorrhea/absent menstrual cycle, irregular vaginal bleeding, acne, hirsuitism and obesity. These patients are at high risk of recurrent miscarriages, infertility, diabetes type II, cardiovascular diseases like hypertension[5-7]and endometrial carcinoma. In this study out of 100 patients about two fourth to three fourth presented with primary infertility and menstrual irregularities and one fourth to two fourth with hirsuitism and obesity. According to a study carried out by Nazir Fetal[8] at Women clinic and advisory centre Islamabad from January 1997 till May 1999, 75% patients of polycystic ovary syndrome presented with primary infertility,84.6% with hirsuitism, 75% with oligo/ amenorrhea and 86.5 % with obesity. Another study conducted at Agha Khan University Hospital from January 2003 till December 2004 by Haq F. et al 508 patients of polycystic ovary syndrome were studied out of which 68.5 % presented with obesity,58.9% with varying degree of hirsuitism, 59% with hyperinsulinemia,74.2% with menstrual irregularity, 63.7 % with primary infertility and 37.7% with secondary infertility. According to Rotterdam consensus, the criteria for diagnosis of PCOS is fulfilled if two out of three following features are present. 1- anovulation (oligomenorrhea or amenorrhea) 2- elevated levels of circulating androgens (hyperandrogenemia) 3- presence of polycystic ovaries on ultrasound. Some of the patients may have polycystic ovaries but they are asymptomatic. This may be an incidental finding when ultrasound of pelvis is performed for some other reason. In a study conducted by Lakhani K et al 7 in the hospital staff volunteers using transabdominal ultrasound the prevalence of PCO in asymptomatic patients was 23%.There are other three studies that showed the prevalence of PCO in asymptomatic patients is 16% and 33%. [9-11]

The biochemically polycystic ovarian syndrome is characterized by increased levels of LH, oestrogen, testosterone, androstenedione and increased LH to FSH ratio.[12] The radiological investigations which are used for the detection of polycystic ovaries are ultrasound (transabdominal and transvaginal) Doppler flow studies, MRI. Out of these four, most commonly used are transabdominal and transvaginal ultrasound because they are easily available and are cost effective. The polycystic ovary is an ovary with volume more than 7.5ml and more than seven 2-5 mm follicles placed peripherally, giving the appearance of string of pearls. The ovarian stromal thickness is increased.[6] In a study conducted by Jonard S et al at the Department of Dialectology and endocrinology France the ultrasonographic criteria they used in the study was 12 or more follicles per ovary and the size of each follicle from 2-9mm.[13] Their sensitivity was 75% and specificity was 99%. In another study by Atiomo WU et al in department of obstetrics and gynaecology UK setting the thresh hold at 10 or more follicles per ovary with peripheral distribution diagnosed 86.4% cases correctly.[14] As we compared our sensitivity and specificity with these results and it is very much comparable. The polycystic ovaries are bilateral however few studies showed that unilateral polycystic ovary is also present. The contra-lateral ovary appears absolutely normal. However, the patients with bilateral polycystic ovaries have higher levels of androsteodion and LH to FSH ratio than the one with unilateral polycystic ovary.[15] The results of a study carried by CJ Gonzale et al in the Department of obstetrics and Gynecology, Kings Hospital London for daily monitoring of follicle proved that the transabdominal and transvaginal ultrasound measurements are very much statistically comparable and reproducible.[16]

Transabdominal ultrasound was able to detect 76 true positive cases out of 100, while 6 patients were false negative giving a sensitivity of 92.6%. 15 patients

were diagnosed as true negative while 3 were false positive giving a specificity of 83.3% to the transabdominal ultrasound. A study conducted by Mujeeb S et al at Agha Khan university the sensitivity of ultrasound in detection of PCO was 87.7% and specificity was 99% which is very much comparable with the results of this study. However, the range varies as the ultrasound performed by different operators and on different ultrasound machines. The positive and negative predictive values of 96.2% and 71.4% respectively and diagnostic efficacy of 91% of our study were also comparable to other studies. In a study conducted at National women's hospital by Farquhar et al on randomly selected 187 patients, the mean age of patients with polycystic ovarian syndrome was 33 years.[17] In another study by Ibanze L. et all the mean age of a patient with PCO is 28 years.[18]

Although this study was conducted in Shifa International Hospital, a tertiary care hospital in Islamabad, which covers mostly the population of Islamabad, however, the results of this study are acceptable and applicable for overall population of Pakistan.

Conclusion

The transabdominal ultrasound is now readily available in almost all the hospitals even in BHU in remote areas of Pakistan. It is used as a primary test in patients presenting with complaints of abdominopelvic pain, amenorrhoea, dysmenorrhoea, oligo or poly menorrhoea, vaginal bleeding, and infertility. It is cost effective. In this study the sensitivity and specificity of transabdominal ultrasound in detection of polycystic ovaries is in very much acceptable range and comparable with many national and international studies. Thus, transabdominal ultrasound can be used as a good substitute of transvaginal ultrasound. It can be used in situations where facility of transvaginal ultrasound is not available, in females who cannot undergo transvaginal scanning (virgins and those with vaginal scaring) and those who decline this examination. It is also helpful in the situations where sonologist is male and female is hesitant to undergo transvaginal scan. Thus, it is evident based study that transabdominal ultrasound gives us very much satisfactory and reliable results in the detection of polycystic ovaries.

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