ORIGINAL RESEARCH

Utility of ovarian volume measurement using spectral color doppler and transvaginal 3D ultrasonography in infertility

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ABSTRACT
Background: Sterility is a common illness that affects 10-15% of couples at some point in their lives. It is a serious clinical, social, and general medical problem.The present study assessed ovarian volume in infertility using spectral color doppler and transvaginal 3D ultrasonography. **Materials & Methods:** 70 female patients with infertility (35) were put in group I and with pregnancy in (control) group II (35). Basal ovarian volume was measured intravaginally using GE Voluson S8 USG-machine, Logiq p9 USG machine. **Results:** There were 27 patients in group I and 20 in group II in the age group of 21-33 years and 8 in group and 15 in group II in the age group of 34-39 years. The difference was significant (P< 0.05). Ovarian volume less than 11.75 cc was seen in 360 patients in group I and 26 patients in group II. Ovarian volume (in cc) of more than or equal to 11.75 was seen in 5 patients in group while 9 patients in group II. The difference was statistically significant (P< 0.05). **Conclusion:** For females in the reproductive age range, ovarian volume can be utilized as a predictor of infertile status.

Keywords: Fertility, Spectral color doppler, Ovarian volume

INTRODUCTION

Sterility is a common illness that affects 10-15% of couples at some point in their lives. It is a serious clinical, social, and general medical problem. Infertility is defined by the World Health Organization based on a year of trying to think about it. According to a 2010 World Health Organization (WHO) estimate, 48.5 million couples worldwide were unable to conceive.[1,2] They discovered that 10.5% of women who had recently conceived an offspring were unable to conceive another child after five years of trying, and 1.9% of women aged 20 to 44 who required a kid were unable to give their first live birth. This addressed a decline of 0.1% and 0.4%, respectively, from 1990.[3]

A decline in the number and quality of the ovarian follicle pool is thought to be the cause of reproductive aging. The number of follicles in females gradually declines with age, beginning in the womb and continuing until after menopause, according to research on human ovarian autopsy.[4] However, there might be significant variations in the quantitative ovarian reserve even among women who are the same age.[5] Ultrasound is a more precise and economical way to determine the time of ovulation than hormone profiles and basal body temperature. Ultrasound is used for both egg retrieval and embryo replacement. Ovulation identification is essential in the treatment of infertility.[6]

Both the total ovarian volume and the number of antral follicles as determined by transvaginal ultrasonography have been shown to be connected with decreased fertility associated with reproductive aging.[7] In recent years, color doppler has emerged as a valuable new diagnostic imaging method in the medical field, especially in areas related to infertility. Uterine abnormalities include male infertility, uterine, endometrial, and ovarian vascularity, polycystic

ovary, follicular monitoring, failed or ectopic pregnancy, and intrauterine lesions.[8]The present study assessed ovarian volumein infertility using spectral color doppler and transvaginal 3D ultrasonography.

MATERIALS & METHODS

The present study comprised of 70 females. All gavetheir written consent for the participation in the study. Data such as name, age, etc. was recorded. Patients with infertility (35) were put in group I and with pregnancy in (control) group II (35). Basal ovarian volume was measured intravaginally using GE Voluson S8 USG-machine, Logiq p9 USG machine. Results were tabulated and subjected to statistical analysis. $P < 0.05$ was considered significant.

RESULTS

Table I Distribution of patients

Age(in years)	Group I	Group II	P value
21-33	27	20	0.05
34-39	8	15	

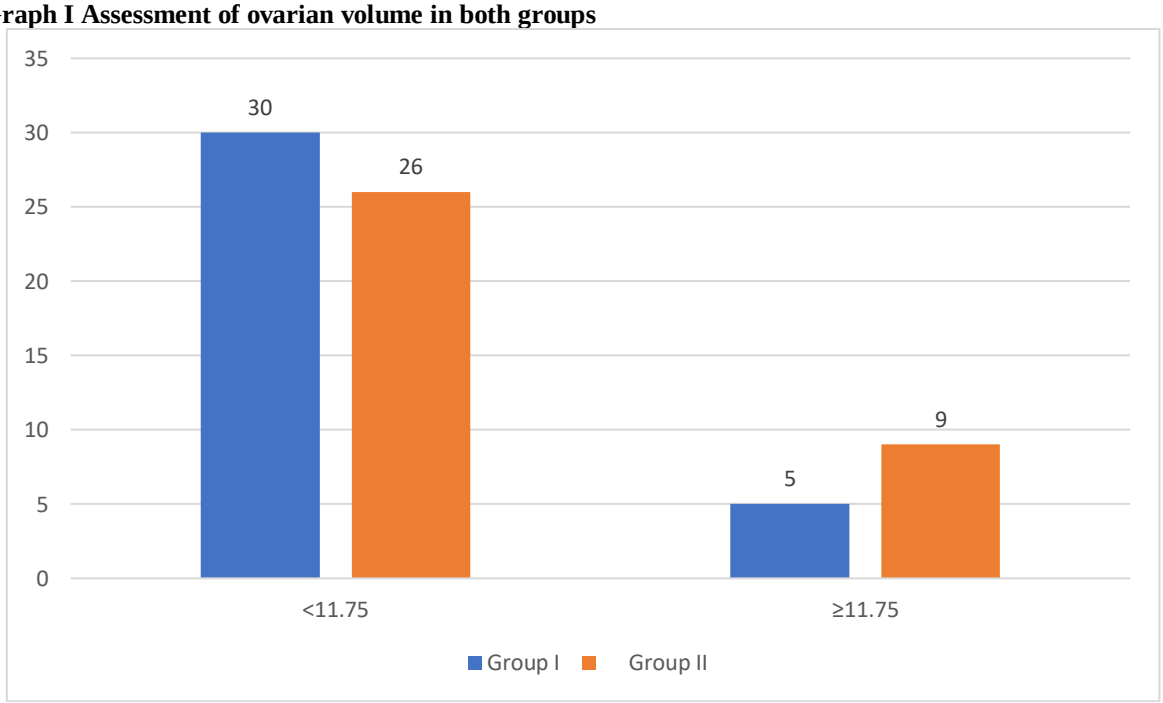
Table I shows that there were 27 patientsin group I and 20 in group II in the age group of 21-33 years and 8 in group and 15 in group II in the age group of 34-39 years. The difference was significant (P< 0.05).

Table II Assessment of ovarian volume in both groups

Ovarian volume(in cc)	Group I	Group II	P value
<11.75	30	26	0.05
≥11.75	5	9	

Table II, graph I shows that ovarian volume less than 11.75 cc was seen in 360 patients in group I and 26patients in group II. Ovarian volume (in cc) of more than or equal to 11.75 was seen in 5 patients in group while 9 patients in group II. The difference was statistically significant (P< 0.05).

Graph I Assessment of ovarian volume in both groups



DISCUSSION

Ovaries can be distinguished using transvaginal sonography (TVS) and transabdominal sonography (TAS). Typically, ovaries are depicted as elliptical shapes with a long-pivot measurement of about 3 cm, a forefront measurement of 2 cm, and a back or cross-over measurement of 1 cm.[9] They soon average to the pelvic vessels on computed long-pivot filters. The ellipsoid equation (length × stature × width × 0.5 = volume in cm3) is used to estimate the ovary's long, short, and A/P measurements.[10] The typical ovary in premenopausal women has a volume of 10 to 12 cm^3. They are particularly well-represented when they have a developing follicle, which is typically between 1.5 and 2.0 cm. The patient's age and the time of the follicular turn of events are used to determine the size of the ovary.[11]Three-dimensional ultrasound (3D-US) is a rapidly developing area of clinical imaging. The ongoing research and continuous improvements in 3D-US have a significant impact on many areas of

clinical application.[12,13,14]The present study assessed ovarian volume in infertility using spectral color doppler and transvaginal 3D ultrasonography.

We found that there were 27 patients in group I and 20 in group II in the age group of 21-33 years and 8 in group and 15 in group II in the age group of 34-39 years. Ng EH et al[15] assessed the effects of age on these markers in fertile women. On the second to fourth day of the menstrual period, fertile Chinese women with regular monthly cycles and no history of ovarian surgery underwent a transvaginal scan with colour Doppler to determine ovarian volume, total antral follicle count (AFC) and mean peak systolic velocity (PSV) of ovarian stromal blood flow, and their serum FSH and inhibin B levels were checked.Out of 145 women scanned, 119 were included in the final analysis. AFC is the only ovarian reserve marker that was significantly different among four age groups (</=20, 21-30, 31-40 and >40 years). AFC had the best correlation with the age of the women, followed by FSH level and ovarian volume. The decline of AFC with age was 3.8% per year (95% confidence interval 2.7-4.9%) in the conventional linear regression model, which was not improved by the biphasic linear regression model.Of the parameters tested, AFC showed the best correlation with women's age and declined linearly at a rate of 3.8% per year.

We found that ovarian volume less than 11.75 cc was seen in 360 patients in group I and 26 patients in group II. Ovarian volume (in cc) of more than or equal to 11.75 was seen in 5 patients in group while 9 patients in group II. Kutlešić R et al[16]investigated the relationship between the ultrasonographic appearance of the endometrium, histological dating by biopsy, hormonal profile and impedance within the segmental uterine and ovarian circulation for assessment of luteal phase function. A total of 61 infertile patients undergoing endometrial biopsy were studied by transvaginal B-mode and color and pulsed Doppler ultrasound. Uterine, radial, spiral, ovarian and intraovarian artery impedance throughout the natural ovarian cycle were related to histological and hormonal markers of uterine receptivity. Plasma levels of follicle stimulating hormone, luteinizing hormone (LH) and estradiol were measured on cycle days 5 and 10 and measurements were continued daily until the detection of the LH surge. Endometrial biopsy was performed 7 days after ultrasonically and hormonally detected ovulation. Progesterone levels were evaluated on the day of endometrial biopsy and 3 days later. After all the data were collected, the patients were divided into two groups, according to the histopathology: 15 patients with normal endometrial dating and 43 patients with a delayed endometrial pattern (i.e. luteal phase defect). One patient with an asynchronous endometrium and two anovulatory subjects were excluded from further evaluation. A significant difference between patients with a luteal phase defect and the control group was obtained for impedance in the uterine ($p < 0.05$), radial ($p < 0.05$), spiral ($p < 0.001$), ovarian ($p < 0.05$) and intraovarian arteries ($p < 0.001$) during the luteal phase. The endometrium showed secretory transformation when serum levels of progesterone were higher than 15 ng/ml. Segmental uterine and ovarian artery perfusion demonstrates a significant correlation with histological and hormonal markers of uterine receptivity. Therefore, blood flow impedance in the corpus luteum and spiral arteries may aid in assessing luteal phase adequacy.

CONCLUSION

Authors found that for females in the reproductive age range, ovarian volume can be utilized as a predictor of infertile status.

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