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ULTRASONOGRAPHHIC DETERMINATION OF TRANSVAGINAL AND TRANSABDOMINAL OVARIAN VOLUME IN PORT HARCOURT, RIVERS STATE

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ABSTRACT
The length, width and anteroposterior dimensions of both the right and left ovaries were measured with an ultrasound machine, ovarian volume was determined using the prolate ellipsisoid formula. The research is a prospective study of 40 non-pregnant and healthy gynaecological healthy females within the age (16-40 years) chosen randomly from the diagnostic center in Pearl Creation Scan, Rumuorosi, Port Harcourt. The mean ovarian volume were found to be 12.95cm^3 and 13.41cm^3 for the right and left respectively. A mean (right and left) range from 10.90cm3 to 17.40cm^3 was also established, significant correlation were noted between age and weight in relationship to ovarian volume. The knowledge of this study is relevant to reproductive biologist in the diagnosis and treatment of fertility cases.

KEYWORDS: Ovary, Transvaginal, Transabdominal, Ultrasound, Port Harcourt.

INTRODUCTION
Medical science has developed many imaging modalities in diagnosis patients having ill-health. Diagnostic medical sonography is an imaging modality which has proven clinically useful in the improvements of fertility related anomalies (Danjem *et al.*, 2016). Ultrasound is becoming increasingly important in medicine both as a diagnostic tool, as a therapeutic modality and surgery. Most medical applications of ultrasound are based on the properties of longitudinal waves in the frequency range 1-15 MHz. (Christensen *et al.*, 1997). As a primary imaging modality, ultrasonography (US) can provide diagnostic information for evaluating ovarian masses. Using a pattern recognition approach through gray-scale transvaginal US, ovarian masses can be diagnosed with high specificity and sensitivity. Doppler US may allow ovarian masses to be diagnosed as benign or malignant with even greater confidence (Danjem *et al.*, 2016). Lots of data have demonstrated that US can accurately characterize about 90% of adnexal masses and the reported sensitivity and specificity of US for detecting ovarian malignancies is 88%-96% and 90%-96%, respectively (Eddy *et al.*, 2004). Scanning of the ovaries is now a routine tool of every infertility clinic world-wide, to such an extent that operating in this field without ultrasound scanning is unthinkable. Recent advances in ultrasound scanning techniques allow the measurement of volumes in three dimensions (Hendricks *et al.*, 2007). Measurements of the long, short and A/P dimensions of the ovary determines ovarian volume by the ellipsoid formula (length × height × width × 0.5 = volume in cm^3 (Bakos *et al.*, 1994).

The review of ten well designed studies on ovarian volume for that purpose concluded that OV presented little applicability in the prediction of poor response of pregnancy (Burger, 1999).

Fertility decline can be attributed to numerous events associated with advancing age, including changes in oocyte quality, frequency and efficiency of ovulation, sexual function, uterine diseases, and the risk of pregnancy complications, such as gestational diabetes and hypertensive disease. Also, genetic factors, smoking, infections, and adnexal surgeries shall be determinants of diminished ovarian reserve in older women (Cohen *et al.*, 1990).

MATERIALS AND METHODS
The study was carried out in Port Harcourt metropolis of Rivers State, precisely in Pearl Creation Scan, Rumuorosi, Port Harcourt, Nigeria. The population studied were all non-pregnant and gynaecologically healthy females. Pregnant wowen and females with ovarian pathologies were excluded from the study. The research is a prospective study whereas collection of data

was from the measurement of ovaries of the subjects scanned using a probe, the body weight of the subjects was also taken and recorded.

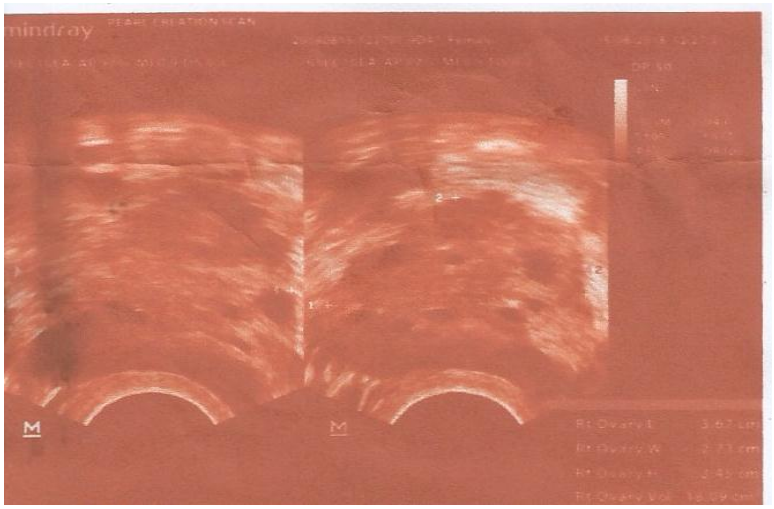
Ultrasound machine (Mindray Dp 50) 3.5mhz and 6.5mhz probe was used to measure the ovaries.

Transabdominal Scan: The subjects were asked to drink about 4-5 glasses of water until the patients feels like micturating. The patients were asked to lie supine on the examination couch, an acoustic gel was applied on the pelvic region, 3.5mhz transducer was placed on the pelvic region, and the subjects was scanned in 3 dimensions.

Transvaginal Scan: The subjects were asked to micturate and lie supine on the examination couch with lower limbs flexed. Transvaginal probe of 6.5mhz was used, an acoustic gel was applied on the probe head. The probe was clothed with a condom, the probe was thrusted into the vaginal and the subjects were scanned in 3 dimensions by an experienced ultrasonographer and senior radiologist.

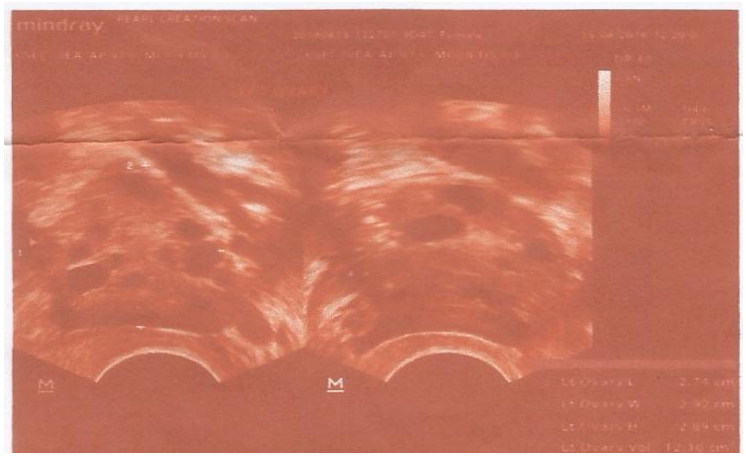
All ovarian volume measurement were taken as the patients visited the diagnostic centre and the body weight measurement was also taken. Data were analyzed using tables.

RESULTS



Right Ovary
Ovary L: 3.67cm
Ovary H: 3.45cm
Ovary W: 2.73cm
Ovary Vol: 18.09cm^3

Figure 1: Sonogram Showing Normal Right Ovarian Volume.



Left Ovary
Ovary L: 2.74cm
Ovary II: 2.89cm
Ovary W: 2.92cm
Ovary Vol: 12.10cm^3

Figure 2: Sonogram Showing Normal Left Ovarian Volume.

Table 1: Mean (Standard Deviation) of the Left Ovarian Volume by Age Group and Body Weight.

Age	Weight (kg)	Left ovarian volume (cm^3)
16-20	11.75±1.19	17.00±4.9
21-25	13.03±2.04	12.89±3.27
26-30	12.22±1.96	11.90±3.52
31-35	13.56±1.93	12.71±4.6
36-40	13.65±2.00	12.58±4.8
Total	12.84±0.74	13.41±1.82

The analysis of this table shows that out of the total number of data sampled, female within the age range 16-20 years has the highest ovarian volume 17.00±4.9 and body weight 11.75±1.19, while female within age range 26-30 years present with the lowest ovarian volume 11.90±3.52 with body weight 12.22±1.96. Also, female within 36-40years present the highest body weight of 13.65±2.00 with ovarian volume 12.58±4.8.

Table 2: Mean (Standard Deviation) of the Right Ovarian Volume by Age Group and Body Weight.

Age	Weight (kg)	Right ovarian volume (cm^3)
16-20	11.23±0.81	14.17±5.44
21-25	12.02±1.45	13.52±3.48
26-30	13.22±2.24	14.80±4.46
31-35	13.89±2.69	10.90±4.04
36-40	13.27±2.50	11.40±2.9
Total	12.72 ±0.96	12.95±1.53

The analysis of this table shows that out of the total number of data sampled, female within age range 16-20years present with the lowest body weight 11.23±0.81 with ovarian volume 14.17±5.44 while female within age range 31-35years present with the highest body weight right 13.89±2.69 with ovarian volume 10.90±4.04. Also, female within 26-30years present with the highest ovarian volume 14.80±4.46 with body weight 13.22±2.24.

Table 3: Mean (Standard Deviation) of Both Ovarian Volume.

Left ovarian volume (cm^3)	Right ovarian volume (cm^3)
17.00±4.9	14.17±5.44
12.89±3.27	13.52±3.48
11.90±3.52	14.80±4.46
12.71±4.6	10.90±4.04
12.58±4.8	11.40±2.9
13.41±1.82	12.95±1.53

The analysis of this table shows that the left ovarian volume is higher than that of the right, also it shows the highest ovarian volume 17.00±4.90 on the left ovary and lowest ovarian volume 10.90±4.04 on the right ovary.

DISCUSSION OF FINDINGS

The result of the present study shows that the data collected and studied varies from each other.

Table 1 shows the ovarian volume the left ovary in relationship to age group and body weight, the ovarian volume range from 11.90±3.52 to 17.00±4.90, it also shows the body weight which ranges from 12.22±1.96 to 13.65±2.00. The mean ovarian volume peaked among the age group 21-30 years, then subsequently declines gradually showing some irregularity over the age groups 30-40. This might be due to hormonal changes. This indicates that the peak age of reproduction is at the second and third decades of life as suggested by Danjem *et al.*, 2016. This trend was also reported by Cohen *et al.*, 1990 and Nwankwo *et al.*, 2011. The decline of ovarian volume with age could be due to the decrease in the number of follicles associated with menopausal transition Burge (1999), changes in local blood supply, and ovarian aging are probably related to the progressively smaller ovarian volume after menopause Oppermann *et al.*, 2003. Contrary to our finding, Christensen *et al.*, 1997.

Table 2 shows the ovarian volume of the right ovary in relationship to age group and body weight, the ovarian ranges from 10.90±4.04 to 14.17±5.44, it also shows the body weight which ranges from 11.23±0.81 to 13.89±2.69. this slight variation between the left and the right ovarian volume is in agreement with Danjem *et al* 2016, and Nwankwo *et al* 2011. However, this finding is at variance with that of Eddy *et al.*, 2004 who found no statistical difference between the left and right ovarian volume.

Table 3 shows the mean ovarian volume of the left and right ovaries respectively. The ovarian volume ranges

from 12.58±4.80 to 17.00±4.90 on the left while the ovarian volume ranges from 10.90±4.04 to 14.17±5.44 on the right. The table also shows the mean ovarian of 13.4±1.82 and 12.95±1.53 for the left and right respectively. However this work is at variance with a similar work by Danjem *et al* 2016, whose result indicated that the mean left and right ovarian volumes were 8.0±2.0 cm^3 and 7.7±2.2 cm^3 respectively, with a mean of 7.9±2.1 cm^3. His work is similar to that reported by Mohammed *et al.,* 2013 in Makurdi, North central Nigeria. Eze *et al.,* 2009 from South East Nigeria and Nwankwo *et al.,* 2011.

However, this study agrees with the previous study by Van Nagell *et al.,* (1995) which could possibly be due to increase in layers of fat around the meso-ovarian with increasing weight.

According to this research, the range of ovarian volume in this locality is from 10.90cm^3 to 17.00cm^3

CONCLUSION

The knowledge of ovarian volume can't be overemphasized, the knowledge of this study will be relevant to reproductive biologist in the diagnosis and treatment of fertility cases.

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