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SONOGRAPHIC ASSESSMENT OF THE UTERINE PARAMETERS OF NULLIPAROUS WOMEN OF IGBO EXTRACTION IN ENUGU METROPOLIS AND IT'S CLINICAL IMPLICATIONS

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ABSTRACT

Data on uterine dimensions in nulliparous women are vital for public health consideration as the presence of uterine pathology in nulliparous women effectively reflects the status of fertility and other gynecological conditions in the general population. This study aimed to assess the uterine parameter of the nulliparous women of Igbos in Enugu metropolis and its clinical implications. The height, and weight of 100 nulliparous women between the ages of 15 - 25 years were measured and their body mass index was determined. Ultrasonographic measurements of the uterine dimension (uterine length, width thickness, anteroposterior diameters, and cervical length) were measured while the women were in dorsal decubitus position having full urinary bladder. The uterine volume was calculated using the formula for a prolate ellipsoid, Volume = 0.52 × D1 × D2 × D3 Where, D1 = maximum length (longitudinal dimension), D2 = maximum AP dimension, and D3 = maximum width (transverse dimension). The mean and standard deviation of longitudinal, transverse, and anteroposterior dimensions, and volume, of the uterus were found to be 7.13cm±0.49 cm, 4.69cm±0.49cm, 3.12cm±0.43, 0.54.67ml±12.36.ml respectively, and the mean cervical length and uterine thickness were 2.30cm±0.47cm and 3.96cm ± 0.08 cm. The uterine AP diameter showed a poor correlation with age and weight but showed a positive correlation with height. Uterine length and width correlate positively with age and height but are poorly correlated with the weight of the subject.

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INTRODUCTION

The uterus is described as a thick-walled hollow muscular organ of the female reproductive system (Chen *et al*., 2023, Chris-Ozoko *et al* 2020). It is responsible for several reproductive functions including; menstruation, implantation, labour, and delivery. The uterus adjusts to reflect hormonal changes during the menstrual cycle and undergoes rapid growth with specialized contractile activity during pregnancy and childbirth. It remains in a relatively quiescent state during the pre-pubertal and postmenopausal years (Fatima *et al*., 2022, Millie *et al*., 2013). Evaluation of the dimensions of the uterus is crucial in the diagnosis and treatment of various pathological conditions of the uterus (Arya, *et al*.2021). Ultrasonography is the most frequently used imaging technique in the assessment of the female internal genital tract, pelvic organs, and associated abnormality (Sirisena *et al*, 2015, mihu 2009). Diagnostic ultrasound is a simple, quick, accurate, reliable, harmless, and non-invasive procedure (Umar *et al*., 2017). This makes it a safe investigation at all ages most especially during pregnancy and childhood (Testa *et al*., 2009). Trans-abdominal and trans-vaginal ultrasonography has been used intermittently during the menstrual cycle (usually during the follicular phase) to assess follicle development (Umar *et al*., 2017). Furthermore, ultrasonography is the most reliable noninvasive method that can give information and on changes in the endometrium (Thellier *et al*., 2018, Chen *et al*. 2023, Saxton *et al*., 1990,). It has also reduced the need for pelvic examination under anesthesia and other invasive procedures such as hysterosalpingography, laparoscopy, and gas gynecography (Chen *et al*., 2023). The ability of ultrasonography to adequately predict uterine size has been widely investigated and studied by many researchers (Parmar *et al*., 2016, Mikolajczyk, *et al*., 2008). Variation in uterine size due to patient age, parity, and hormonal status in the menstrual cycle has been reported previously (Umar *et al*., 2017,). These changes can be investigated by ultrasonography examination, which also reviews uterine pathology if and when present. The aim was to assess the uterine parameters of nulliparous women of Igbo extraction in the Enugu metropolis and its clinical implications.

MATERIALS AND METHODS

Research Design: This was a prospective study that involved the measurement of anthropometric parameters of the subjects and their uterine dimensions.

Area of Study: The study was carried out in an urban center of Enugu state, South East Nigeria. The subjects were selected from the Stuff Link lesson center and Nulliparous female volunteers among student nurses of St Mary's Hospital.

Population of study: One hundred participants within the age range of 15-25 years took part in the study.

Inclusion Criteria: Healthy Nulliparous Igbo women between the ages of 15 to 25 years with no history of previous pregnancy or pelvic pathology.

Anthropometry: Uterine measurements were carried out by the use of an ultrasonography machine. A standiometer was used to obtain the weight and height of the participants.

The following uterine dimensions were measured:

1. Uterine length (longitudinal dimension) - Measured from the highest fundal point in the midline to the corresponding midline cervical point in the sagittal section.
2. Uterine width (transverse diameter) - Measured as the widest transverse diameter in the transverse section.
3. The anteroposterior (AP) diameter: Measured as the anteroposterior diameter, in the sagittal section at 90^{o} to the longitudinal plane at the widest fundal dimension.
4. Uterine volume - was calculated using the formula for a prolate ellipsoid as shown below:

$$\text{Volume} = 0.52 \times D1 \times D2 \times D3$$

Where,
D1 = maximum length (longitudinal dimension)
D2 = maximum AP dimension
D3 = maximum width (transverse dimension).

5. Cervical length - measured as the distance between the internal and external os,
6. Uterine thickness - measured as the maximum thickness in the longitudinal uterine axis. The measurement was obtained with a 5.0MHz trans-abdominal transducer.
7. Weight - was measured using a weighing scale with zero adjustment. The subjects wore minimal clothing without shoes. The weight was recorded to the nearest 0.1kg.
8. Height - was measured using a standiometer and measurements were recorded in meters (m) to the nearest decimal point. The subjects stood erect with arms hanging at the sides and they were barefooted.
9. Body Mass Index (BMI) - Was calculated from height and weight as

$$\text{BMI} = \frac{\text{Wt (kg)}}{\text{Ht (m2)}}$$

Procedure: Subjects were instructed to drink about 500-1000 ml of water to promote diuresis and to refrain from micturating until the examination was completed. A full bladder for the ultrasonography examination of the non-gravid uterus was achieved, thus acting as an acoustic window for its visualization (Dixit *et al*., 2021). Scanning was done when the subject felt the urge to micturate, i.e., having a full bladder. At each ultrasonography examination session, subjects were scanned in the supine position in both longitudinal and transverse planes, and uterine size was determined by three measurements obtained directly from the frozen image for each of the following parameters using an in-built caliper.

Statistical Analysis: Data were analyzed using a statistical package for social sciences (SPSS) version 23. Data were expressed as mean and standard deviation. Pearson correlation was used to study the relationships between the various parameters and dimensions. Regression formulae for some of the dimensions were derived.

RESULTS

A total of 100 nulliparous women aged 15-25 years participated in this study. All the participants were Igbo residents in Enugu.

Table 1. Frequency of the subject by age

AGE(YEARS)	FREQUENCY	PERCENTAGE (%)
15	3	3%
16	5	5%
17	15	15%
18	6	6%
19	13	13%
20	14	14%
21	13	13%
22	7	7%
23	6	6%
24	11	11%
25	7	7%
TOTAL	100	100%

As shown in Table 1, a total of 100 nulliparous women aged 15-25 years participated in the study. The age with highest percentage distributions was 17 (15%), followed by 20 (14%), 19 and 21 (13% each) others were 24 (11%), 25 and 22 (7% each) with 15 years as the least (3%).

Table 2. Mean ±SD of the Anthropometric Parameters of the Subject

Parameters	Mean±SD
Age(Years)	20.19±2.79
Weight(Kg)	58.29±9.62
Height(M)	1.63±.056
BMI	17.91±2.75

Table 2 shows that the Mean ± SD of the subjects' age, weight, height, and BMI were 20.19±2.79years, 58.29 ±9.62 kg, 1 .63 ±.056 m, and 17.91±2.75 respectively.

Table 3. Mean ±SD of Uterine Parameters

Parameters	Mean ±SD
Uterine Length(cm)	7.13±0.49
Uterine Width(cm)	4.69±0.48
A/P Diameters(cm)	3.12±0.43
Uterine Volume(Ml)	54.67±12.36
Cervical Length(cm)	2.30±0.47
Uterine Thickness(cm)	3.96±0.82

Table 3 shows that the Mean ± SD of the uterine length, uterine width, A/P diameter, uterine volume, cervical length, and uterine thickness were 7.13 ±0.49cm, 4.69 ±0.48, 3.12 ±0.43, 54.67 ±12.36, 2.30 ±0.47, 3.96 ±0.82 respectively.

Table 4. Correlation matrix of the subjects' anthropometric parameters and uterine dimensions

	AGE (YRS)	WT (KG)	HT (M)	U/L (CM)	U/W (CM)	A/P (CM)	U/V (ML)	C/L (CM)	U/T (CM)	BMI
AGE (YRS)	1	.542	.238*	.918**	.521**	0.196	.632**	.471**	.405**	.535**
W/T (KG)	.542**	1	.431**	.515**	.375**	-0.017	.303**	.313**	0.194	.982**
H/T (M)	.238*	.431**	1	.285**	.236*	0.153	.287**	0.133	0.059	.256*
U/L (CM)	.918**	.515**	.285**	1	.506**	0.139	.620**	.392**	.362**	.494**
U/W(CM)	.521**	.375**	.236*	.506**	1	.244*	.761**	.233*	0.183	.353**
A/P (CM)	0.196	-0.017	0.153	0.139	.244*	1	.753**	-.220*	0.023	-0.055
U/V (ML)	.632**	.303**	.287**	.620**	.761**	.753**	1	0.088	.222*	.263**
C/L (CM)	.471**	.313**	0.133	.392**	.233*	-.220*	0.088	1	.283**	.312**
U/T (CM)	.405**	0.194	.542**	.362**	0.183	0.023	.222*	.283**	1	0.195
BMI	.535**	.982**	.256*	.494**	.353**	-0.055	.263**	.312**	0.195	1

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

W/T (Weight), HT (Height), U/L (Uterine length), U/W (Uterine width), A/P (Antero posterior), U/V (Uterine volume), C/L (Cervical length), U/T Uterine thickness)

As shown in Table 4, there is a strong correlation between the various parameters/dimensions measured ($p<0.05$). The anteroposterior diameter of the uterus does not correlate with most of the other parameters except with the uterine width and volume. However, its correlation with cervical length was negative.

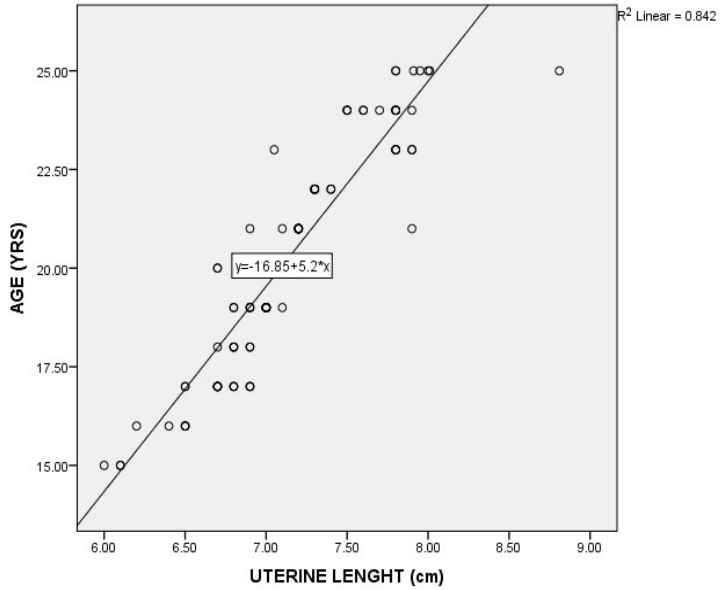

Figure 7. Multiple linear regression of age and uterine length

The regression equation for predicting age (yrs.) for uterine length is:
Age (years) = -16.85 + (5.2xuterine length)

R^2=0.842
= 84.2%

This implied that 84.2% of our data fit into the multiple linear regression model.

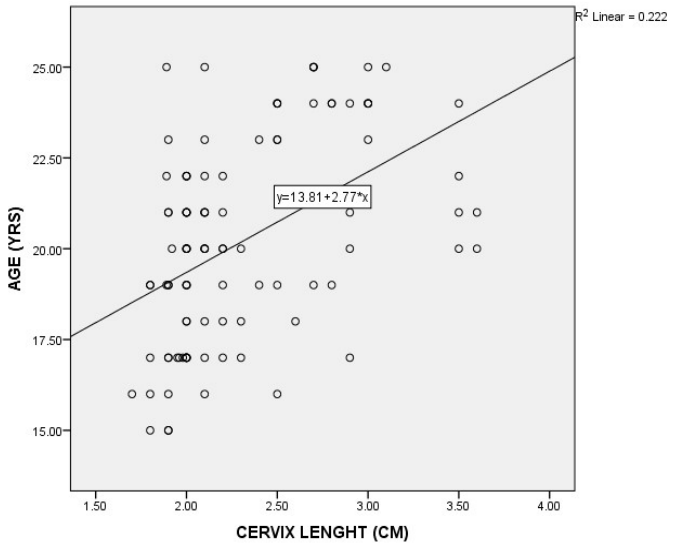

Figure 8. Multiple linear regression model of age and cervical length

The regression equation for predicting age (yrs.) for cervix length is:

Age (years) = 13.81+2.77 x (cervix length)
R^2= 0.222
= 22.2%

This implied that only 22.2% of our data fit into the multiple linear regression model.

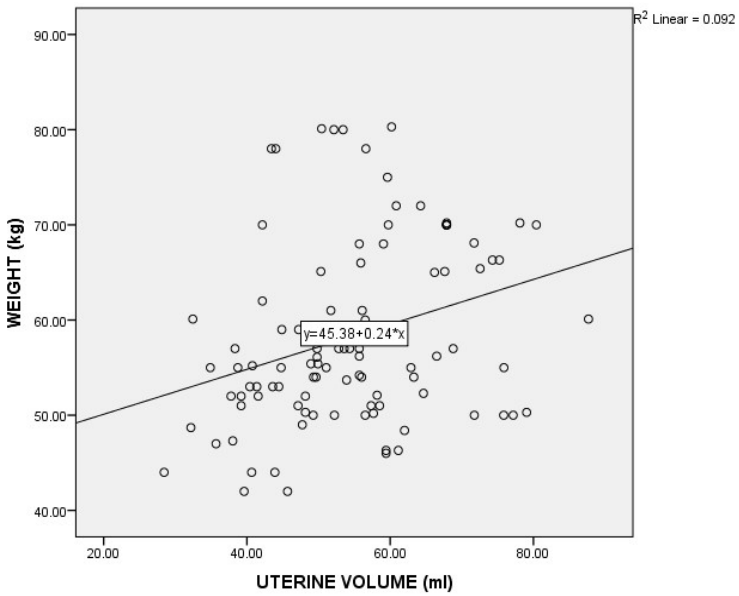

Figure 9. Multiple linear regression of weight and uterine volume

The regression equation for predicting weight (kg.) for uterine volume is:

Weight (m) = 45.38=0.24x (uterine volume)

R^2= 0.092

This implied that only 9.2% of our data fit into the multiple linear regression model.

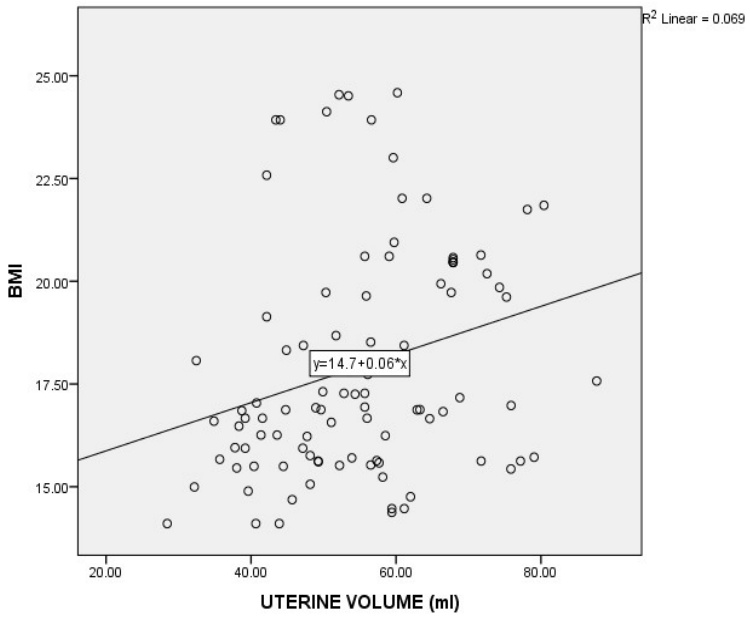

Figure 10. Multiple linear regression of BMI and uterine volume

The regression equation for predicting BMI for uterine Volume is:

BMI = 14.7+0.06 x (uterine Volume)

R^2=0.069

= 6.9%

This implied that 0.069% of our data fit into the multiple linear regression model.

DISCUSSION

Knowledge of the mean values of the normal uterine size and its correlation is essential in predicting uterine pathology and will also enable the radiologist to make accurate diagnosis at each ultrasound session. The size of the uterus varies in different individuals. In this study, the mean values of the uterine length, uterine width, anteroposterior dimension of the uterus, cervical length, uterine thickness, and uterine volume for the nulliparous women were 7.13cm ±.492 cm, 4.69cm ±.480cm, 3.122cm ±.420cm, 2.304cm ±.474, 3.959cm ±.818cm and 54.670cm ±12.355ml respectively. These findings were similar to Ajay *et al.,* (2016) who noted that in nulliparous women, the mean uterine length was 7.10x4.52x3.27. The dimensions were in tandem with those of Arya et al., (2021) except for the uterine volume where they noted a higher value. However, The smaller uterine volume in our study was probably because their subjects were females of reproductive age and not nulliparous females. Ijeruh *et al.,* (2017) reported that their dimensions were 3.6cm ±0.7 cm for the AP diameter, 6.3cm ± 1.2 cm, and 5.3cm ± 0.7cm for the longitudinal and transverse dimensions, respectively. However, the age range of the subjects in the study was 10-70 years. The study by Ohagwu *et al*. (2009) established the uterine dimensions for nulliparous women as; 3.3 cm±0.5 cm, 5.7 cm ± 0.6 cm, and 4.1cm ± 0.5 cm for AP, longitudinal, and transverse dimensions, respectively. The findings of Okwor *et al*., (2020) whose subjects were postpartum women were higher than those of the present study. Our study showed that there are strong correlation between the various parameters/dimensions measured ($p<0.05$). This implies that the uterine length increases with an increase in age. The anteroposterior diameter of the uterus does not correlate with most of the other parameters except with the uterine width and volume. Ijeruh *et al*., (2017) also found that there was a significant statistical correlation between age, height, and weight of their subject with the uterine dimensions. They also reported a positive correlation between uterine length and age, body weight, and height in nulliparous women.

CONCLUSION

This study showed the mean uterine dimensions in nulliparous Igbo women in Enugu, Nigeria increase with the increase in age, height, and weight of the subjects. The uterine AP diameter showed a poor correlation with age but a significant correlation with height and poorly with weight. Uterine length and width correlated positively with age, and height but poorly with the weight of the subjects. A statistically significant correlation was found between the uterine volume and physical parameters.

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Conflict of interest – Nil

REFERENCES

1. Arya A, Tomar S, Diwan RK, Pandey A, Manik P (2021). Uterine parameters of clinical importance in North Indian females of reproductive age – An ultrasonographic evaluation. *Natl J Clin Anat*. 10:232-5.

10. Okwor CN, Agunwa CC, Enebe JT, Nnamani AO, Obi IE, MGBOR SO, Obikili EN (2020). Sonographic Evaluation of Uterine Dimensions in Postpartum Women of Reproductive Age-Study from Enugu, Southeast Nigeria. *J Clin Diag Res.* 14(8): 1-4
11. Parmar AM, Agarwal DP, Hathila N, Singel TC (2016). Sonographic measurements of the uterus and its correlation with different parameters in parous and nulliparous women. Inter J Med Sci Edu. 3: 306-310
12. Saxton DW, Farquhar CL, Rae T, Beard RW, Anderson MC, Wadsworth J (1990). Accuracy of ultrasound measurement of female pelvic organs. *Br J Obstet Gynaecol.* 97:695-9.
13. Sirisena UAI, Jwanbot DI, Pam SD, Goshit SJ, Samson RI(2015). Normal Uterine Size in Women of Reproductive Age in Jos, Nigeria: An Ultrasonographic Investigation. Journal of Health, Medicine and Nursing 19:71-76
14. Testa AC, Bourne TH.(2009). Characterizing pelvic masses using ultrasound. Clin Obstet Gynaecol. 23:725-38.
15. Thellier, E. Levaillant JM, Pourcelot AG, Houllier M, Fernandez H. (2018). Are 3D ultrasound and office hysteroscopy useful for the assessment of the uterine cavity after late fetal loss? J. Gynecol. Obstet. Hum. Reprod. 47(5): 183–186.
16. Umar UM, Isyaku K, Adamu YM, Abubakar SA, Kabo NA, Nura I, et al. (2017). Sonographic measurement of uterine dimensions in healthy nulliparous adults in Northwestern Nigeria. Sahel Med J.20:1-7.
2. Chen F, Gong Y, Xie Y, Zhu L, Chen L, Xiao J, Jiang N, Sun L, Sui L (2023). Assessment of key parameters of normal uterus in women of reproductive age. Scientific Reports. 13 (17): 1-10
3. Chris-Ozoko L.E, Soezea, Oyem J. C, Okpeki J (2020). Ultrasonographic uterine dimensions in non-pregnant adult Females at Agbor Delta State; Establishment of norms. Inter J Com Res. 9(1): 19 – 26
4. Dixit M, Jaiswal V, Usmani Y, Chaudhary R. (2021). Uterine and ovarian parameters in healthy North Indian girls from 5 to 16 years by ultrasonography. Pediatr Endocrinol Diabetes Metab . 27 (1): 37–41
5. Fatima N, John A, Ali A, Amir A, Mubbarka M (2022). Measurement of Uterus Sizes of Multiparous Women using Ultrasound. *J Therap Rehab Sci.* 3(1):7-10
6. Mihu D and Mihu C.M (2011) Ultrasonography of the uterus and ovaries. *Medical utrasonography.* 13(2):249-252
7. Millie AB, Thomas RG, Thomas RG (2013). Uterus anatomy. Medscape. Available from: http//www.emedicine.medscape.com/ article/1949215.
8. Mikolajczyk RT, Standforf JB, Ecochard R (2008). Multilevel model to assess sources of variation in follicular growth close to the time of ovulation in women with normal fertility: A multicenter observational study. Reprod Biol Endocrinol. 6:61-7
9. Ohagwu CC, Mr. Ugwu AC, Idigo FU (2009) Uterine roundness index: model formulation and nomogram for a Nigerian population. *Internet J Med Update.* 4(1): 25-28

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