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ORIGINAL RESEARCH ARTICLE

SONOGRAPHIC MEASUREMENT OF NORMAL UTERINE DIMENSION IN NULLIPAROUS ADULTS

Prabhat Basnet[1,*], Pramod Kumar Chhetri[1], Kripesh Thapa[1]
[1]Department of Radiology, College of Medical Sciences, Bharatpur Nepal

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***Correspondence to:** Prabhat Basnet, Department of Radiology, College of medical sciences, Bhartpur-10, Chitwan Nepal.*
Email: pbasnet99@gmail.com
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ABSTRACT

Background: Normal uterine size determination of nulliparous women is very important for the diagnosis of the various uterine pathology. There are different pathologies of uterus but before describing the pathological aspects normal dimension has to be defined. Ultrasound is the first tool for scanning female pelvis pathology. The objective of the study is determining the normal uterine dimension in the nulliparous adults and correlate with the age, height, weight and BMI.

Methods: The study was conducted in Department of Radiology and Imaging College of medical sciences, Bharatpur. Patient presenting with any other symptoms than pelvic cause are included in study with age group (15-25years). All ultrasound examinations were performed using Toshiba Aplio 500. A cross-sectional study is conducted among the 49 patients in College of Medical Sciences, Bharatpur, over the period of one year (November 2020 to October 2021).

Results: Present study showed the mean length, AP diameter, width and volume of the uterus in nulliparous women between the ages of 15-25years. The mean length is 6.88±0.75cm, mean AP diameter is 3.89±0.44cm, mean width is 4.2±0.50 and mean volume is 61.41±16.96 cc. The present study showed the strong correlation between the weight of the patient and uterine dimension, however there is no significant correlation could be established between the age, height and body mass index of the patients with volume uterine dimension.

Conclusions: Normal uterine dimension in Nepalese population is similar to the Nigerian, Scandinavian and Iranian population however the dimensions are smaller than the European population which may be due to the body habitus and genetic factors. There is significant correlation between the weight of patient and volume of the uterus.

INTRODUCTION

The normal uterus is an inverted pear shaped, hollow, thick-walled, muscular organ of the female reproductive tract that lies in the lesser pelvis. It is divided into two portions: body and cervix. About midway between the apex and base, is a slight constriction known as the isthmus. Normal uterine size during the reproductive life stage varies with patient age and parity. The mean dimensions of the normal uterus in women of childbearing age are approximately 8 cm long, 4 cm high, and 5 cm wide, with the multiparous uterus being larger than the nulliparous uterus by as much as 1 cm in each dimension.[1]

There are various modalities for uterine evaluation. US, CT and MRI are used in our day-to-day practice. Among all these modalities USG is most commonly used to evaluate the uterus in reproductive age females. US offers the advantages of widespread availability, low cost and lack of exposure to ionizing radiation. In appropriate candidates, endovaginal US usually offers higher-resolution imaging than transabdominal US and may be the only examination needed for diagnostic evaluation of the uterus, ovaries, and adnexa. Assessment of the uterine cavity can be improved with the use of hysterosonography, a technique that involves distending the uterine cavity with the injection of sterile saline or water into the endometrial cavity during an endovaginal US examination[2,3] Endovaginal US is also the most reliable noninvasive method that can give information on changes in the endometrium.[1,4] It has reduced the need for pelvic examination under anesthesia and other invasive procedures such as hysterosalpingography, laparoscopy, and gas gynecography.[5,6] MR imaging is an excellent method for imaging evaluation when US is not feasible or the findings at US are inconclusive. Computed tomography (CT) is not generally considered the primary imaging modality for the evaluation of suspected gynecologic disease, it is commonly performed in patients with acute symptoms.

The aim of our study is to determine the dimension of the uterus and see the correlation between the age, height, weight and BMI of the female patients with uterine dimension.

METHODS

The study was conducted in Department of Radiology and

Imaging, College of Medical Sciences, Bharatpur. from November 2020 to October 2021. All USG examination is done using Aplio 500 Toshiba Machine with convex array deep probe of frequency 3.5MHZ. Patient presenting with any other symptoms than pelvic cause are included in study with age group (15-25years). The sampling technique used in this study was non probability (conventional) sampling.

We did the examination in supine position in full bladder of nongravid uterus. Measurement is done in both longitudinal and transverse plane and uterine size determined by three measurements obtained from frozen image. The longitudinal dimension in sagittal section from the highest fundal point in the midline to the corresponding midline cervical point. The anteroposterior (AP) diameter, in sagittal section at 90° to the longitudinal plane at the widest fundal dimension. Greatest (widest) transverse diameter (width) in transverse section.

Uterine volume is calculated by ellipsoidal formula,
Volume = 0.5332 x D1 x D2 x D3

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

Weight of the patient was measured in Kg and height measured in meter.

Inclusion criteria were nulliparous women in the 15–25 years age group referred to the Radiology Department, College of Medical Sciences, Bharatpur, for US examination other than pelvic cause and no history of pelvic pathology. While the exclusion criteria were patients with age <15 or >25years, presenting with pelvic complains, with h/o uterine surgery and prior pregnancy.

Data obtained are compiled and analyzed using standard statistical analysis. SPSS 20.0 and Microsoft Excel were used for the data analysis and presentation. The research protocol is submitted and approved by the ethical review committee of College of Medical Sciences, Bharatpur. The relationships with age, weight, height, and the different uterine dimensions in the subjects are examined using the regression and correlation coefficients. The analysis of variance is performed to test the significance of regression coefficients.

RESULTS

Total 49 patients are enrolled in present study with age group of 15-25years nulliparous women. The descriptive analysis (table 1) showed mean age of 20.35±2.72 years, mean height of 1.6±0.098meters, mean weight of 64.16±8.77kg, mean D1 of 6.88±0.75cm, mean D2 of 3.89±0.44cm, mean D3 of 4.2±0.50cm, mean volume of 61.41±16.96cc and mean BMI of 24.95±3.32. The minimum height is 1.4meter and maximum is 1.8meters. The minimum weight is 45kg and maximum is 80kg. The minimum D1 is 5.8cm and maximum is 8.2cm. The minimum D2 is 2.8cm and similarly maximum is 4.6cm and minimum D3 is 3.2cm and maximum is 5cm. The minimum volume of uterus is 28.58cc and maximum being 93.2cm. At last minimum BMI is 18.7 and maximum is 31.2.

Table 1: Mean and standard deviation of the various parameters in present study

Statistics	Mean	Std. Deviation	Minimum	Maximum
Age	20.35	2.728	15	25
Height	1.606	0.0988	1.4	1.8
Weight	64.16	8.773	45	80
D1	6.884	0.7507	5.8	8.2
D2	3.896	0.4477	2.8	4.6
D3	4.212	0.5003	3.2	5
Volume	61.4116	16.9616	28.58	93.2
BMI	24.959	3.3234	18.7	31.2

Table 2: Body mass index of the nulliparous women between the age of 15-25 in preset study

BMI Category	Frequency (%)
Underweight	-
Normal weight	24 (49%)
Pre-obesity	20(40.8%)
Obesity class I	5 (10.2%)
Obesity class II	-
Obesity class III	-
Total	49 (100%)

Present study showed normal weight women in around 49% and pre-obesity in 40.8% and obesity class I in 10.2% women.

Table 3: Correlation between the volume of uterus and different parameters in present study using Pearson correlation

Correlations		Volume (CC)
Age	Pearson Correlation	0.027
	Sig. (2-tailed)	0.852
	N	49
Height	Pearson Correlation	0.257
	Sig. (2-tailed)	0.075
	N	49
Weight	Pearson Correlation	.314*
	Sig. (2-tailed)	0.028
	N	49
D1	Pearson Correlation	.770**
	Sig. (2-tailed)	0
	N	49
D2	Pearson Correlation	.861**
	Sig. (2-tailed)	0
	N	49

D3	Pearson Correlation	.815**
	Sig. (2-tailed)	0
	N	49
Volume	Pearson Correlation	1
	Sig. (2-tailed)	
	N	49
BMI	Pearson Correlation	0.093
	Sig. (2-tailed)	0.524
	N	49

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

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

The study shows that there is no significant correlation between the age of the patients and the height and BMI of the patients with volume of the uterus, however there is significant correlation shown between the weight of the patient and volume of the uterus.

DISCUSSION

Present study showed the mean length, AP diameter, width and volume of the uterus in nulliparous women between the ages of 15-25years. The mean length is 6.88±0.75cm, mean AP diameter is 3.89±0.44cm, mean width is 4.2±0.50 and mean volume is 61.41±16.96 cc. The present study showed the strong correlation between the weight of the patient and uterine volume, however there is no significant correlation could be established between the age, height and BMI of the patients and volume of the uterus.

The study conducted by Umar et al.[7] in North western Nigeria showed the mean for the AP diameter, length, width, and volume of the uterus has been obtained for the nulliparous women in the age range 17–24 years. It was found to be 3.3 cm ± 0.3 cm for AP diameter, 6.4 cm ± 0.4 cm for length, and 5.1 cm ± 0.2 cm for transverse diameter. The volume was 57.4 cm3 ± 9.1 cc and there was significant correlation between the weight and height of the females with the uterine dimension and poor correlation between the age and uterine dimension. The uterine dimension is similar to our study and also the correlation between the weight and uterine dimension is also well established in our study, however no correlation was shown between the age, height and BMI in our study.

The study by Ohagwu et al.[8] established the uterine dimensions for nulliparous women 3.3 cm ± 0.5 cm, 5.7 cm ± 0.6 cm, and 4.1 cm ± 0.5 cm for AP, longitudinal, and transverse dimensions, respectively. This is similar to our study. However, there is significant correlation between the age, weight and height of the subjects, unlike our study which showed only strong correlation between the weights with uterine dimensions.

Present study showed almost similar uterine dimension as in case of the study done by Esmaelzadeh et al.[9] which showed mean dimensions for the nulliparous women in Babol, Northern Iran as 3.20 cm ± 0.1 cm, 7.28 cm ± 1.3 cm, and 4.28 cm ± 1.2 cm for AP diameter, longitudinal, and transverse dimensions, respectively. However, there was strong correlation between the age and BMI which was not shown in our study.

Michael et al.[10] study showed that the normal adult uterus measures approximately 7.0–9.0 cm long, 4.5–6.0 cm wide, and 2.5–3.5 cm deep (AP dimension) showed higher dimensions comparing to present study. Similarly Merz et al.[11] showed uterine dimensions in nulliparous women to be 4.0 cm ± 0.6 cm, 7.3 cm ± 0.8 cm, and 3.2 cm ± 0.5 cm for AP, longitudinal, and transverse dimensions, respectively and Piiroinen[12] established the mean uterine dimensions for nulliparous women to be 2.9 cm ± 0.4 cm and 7.6 cm ± 0.7 cm for AP and longitudinal dimensions, respectively. This contrasts with the present study, in which slightly higher dimension of uterus noted. It may be due to the wide range of the age group in above mentioned studies, whereas present study has narrow range of age group from 15-25.

The other studies conducted by Holt et al.[13], Waldroup et al.[14] and Sanders et al.[15] showed the uterine dimensions to be 7.0 cm, 4.0 cm, and 4.0 cm for length, width, and AP dimensions in nulliparous women, 8.0 cm, 3.0 cm, and 5.5 cm for longitudinal, AP, and transverse dimensions in all categories of women in the post pubertal age both nulliparous and multiparous and 4.0 cm, 6.0–9.0 cm, and 4.0 cm for AP, longitudinal, and transverse dimensions for nulliparous women, respectively, also contradicts present study.

CONCLUSION

The study showed mean length is 6.88±0.75cm, mean AP diameter is 3.89±0.44cm, mean width is 4.2±0.50 and mean volume is 61.41±16.96 cc. The present study showed the strong correlation between the weight of the patient and uterine volume; however, there is no significant correlation could be established between the age, height and BMI of the patients with volume of the uterus. The study plays significant role is determining the pathologically large and small sized uterus in the nulliparous women in Nepalese population.

CONFLICT OF INTEREST: None

FINANCIAL DISCLOSURE: None

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