

Ultrasound Biometry of the Non-pregnant Uterus in Beninese Women

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Abstract: Uterus is a female organ that undergoes enormous variations during her genital life. To study the dimensions of the normal uterine biometry of Beninese women outside pregnancy. This study was a cross-sectional prospective study from November 05, 2009 to July 31, 2010. It involved 119 Beninese women aged 13 to 70 years identified in two ultrasonography services, namely Autonomous Centre of Radiology (CAR) of EPAC-UAC (Polytechnic School of Abomey Calavi) and the Principal Hospital of Ouidah. The study focused on women who came to ACR to undergo pelvic ultrasound. Included in our sample, women who did not present uterine pathologies such as fibroma, synechia, polyp, cancer, with no uterine scar on ultrasound. Excluded from the study, pregnant women, women who had a cesarean section. Measurements were made in longitudinal and transverse sections by supra-pelvic ultrasound. Uterine length and its thickness were performed on the longitudinal section and its width on the cross-section. The average size of the Beninese woman's uterus were: length=86.17 mm; width=49.24 mm; thickness=37.42 mm. According to the parity we have for nulliparous (length=80.08 mm; width=48.02 mm; thickness=35.70 mm), primiparous (length=88.47 mm; width=48.24 mm; thickness=37.47 mm), multiparous (length=99.33 mm; width=52.43 mm; thickness=41.50 mm). The dimensions of the non-pregnant uterus of Beninese women were 86.17mm (IC 95%: 83.09 - 92.40) for the length, 49.24 mm (95% CI: 47.45 - 51.02) for the width and 37.42 (IC 95%: 36.02 38.81). All these dimensions increase with parity. Parity is a factor which contribute to the uterine size variation.

Keywords: Ultrasound, Normal Uterus, Dimension

1. Introduction

Knowledge of the female genital is an obligation for the gynaecologist to practice his or her specialty. One of the essential organs of this system is the uterus, by its function and the explorations to which it is subject. During genital life, from childhood to old age, this organ undergoes enormous variations in its anatomical characteristics [1]. Clinical exploration gives an approximate assessment of the anatomical dimensions of the uterus. With the advent of ultrasound, the exploration of the uterus is easier and makes possible to know its morphological characteristics [2]. Ultrasonography is particularly suited to the diagnostic

investigation of uterine size because it limits the patient's exposure to ionizing radiation, permits multi-sectional scanning of organs and is convenient and relatively inexpensive to use [3, 4]. Several authors have reported ultrasound uterine measurement, including length, width and thickness about to nulliparous and multiparous [5-9]. They had led similarly studies but in function different stages of genital life. All previous studies were not taken place in Africa, but recently, some authors had led ultrasound uterine measurement in Ghana but a young population (nulliparous) [10]. Only in Nigeria this study had been carried out on both nulliparous and parous population. However they included in this previous study premenarche subject [11]. For our knowledge a similarly study was not performed on Beninese

population. For this reason, it seemed important to us to carry out the normal uterine biometry determination study on a Beninese menarche sample. We also researched an association between its values the women parity.

2. Material and Methods

Our study took place from 05 November 2009 to 31 July 2010 and was conducted mainly in the Autonomous Centre of Radiology (ACR) of the Polytechnic School of Abomey-calavi (EPAC). We used a COMBISON 310A ultrasound scanner with a 3.5 MHZ sector probe and a SONY reprograph.

The study focused on women who came to ACR to undergo pelvic ultrasound. Included in our sample, women who did not present uterine pathologies such as fibroma, synechia, polyp, cancer, with no uterine scar on ultrasound. Excluded from the study, pregnant women, women who had a cesarean section or myomectomy or a previous pathology or surgery that could influence uterine morphology.

2.1. Examination Technical

The woman is placed in supine position, her arm along her body, her feet in extension and her pelvic region undressed. Longitudinal sections were performed by placing the probe longitudinally on the median plane between the umbilicus and the pubic symphysis. The paramedian planes were defined by moving the probe laterally (Figures 1, 2).

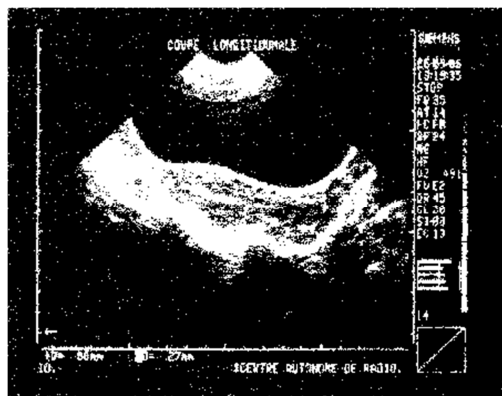


Figure 1. Longitudinal section of the uterus.

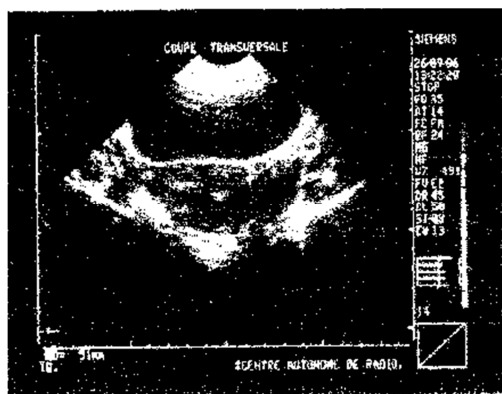


Figure 2. Cross-section of the uterus.

Three measurements were generally made on this section: the length, the thickness of the uterus and the thickness of the endometrium. Uterine length is defined ultrasonographically by measuring the distance between the midpoint of the outer wall of the uterine fundus and the midpoint of the inner cervix. The thickness of the uterus or anteroposterior diameter is obtained by the largest axis connecting the two outer walls of the uterine body; this axis being perpendicular to the previous axis. The thickness of the endometrium is defined by measuring the distance between the two endometrial layers [4].

The cross sections are obtained by turning the probe 90° from the longitudinal position in the opposite direction of the clockwise on the median plane always between the umbilicus and the pubic symphysis. Generally, on this cut is evaluated the width or transverse diameter by measuring the maximum distance separating the bases of the two uterine horns.

2.2. Statistical Analysis

Once the review was completed, only results that confirmed the inclusion criteria were considered. The biometric data from these results were classified and ordered for computer processing using the EPI INFO 6.4 French version software.

After entering the data from our survey, we successively determined the mean, maximum and minimum values of the different uterine dimensions and performed t-test for research association between uterine dimensions and parity.

A difference in the means of two samples is considered significant when the first-species error threshold is less than 0.05.

We obtained the verbal consent of the patients after the presentation of the study, which was authorized by the centre's management.

3. Results

3.1. Patient Age Profile

In this study period we enrolled 119 women that age ranged from 13 to 70 years.

In this sample, 28 (23.53%) women were aged from 13 to 20 years, 82 (68.91%) were between 21 and 39 years old, 4 (3.36%) were between 40 and 50 years old, and 4,20% beyond 50 years.

Our sample, 73 nulliparous (61.34%), 19 primiparous (15.97%) and 27 multiparous (22.69%).

3.2. Values of the Dimensions of the Uterus (Table 1, Table 2, Table 3, Table 4, Table 5)

Table 1. Minimum, maximum and mean values of uterine dimensions.

	Mean (mm)	V _{Mm}	V _{Mx}	Standard deviation	95% CI AVERAGE
Length	86.17	49	143	17.24	83.09 -92.4
Width	49.24	23	74	10.04	47.45 - 51.02
Thickness	37.42	19	70	7.85	36.02 - 38.81

In our study the mean of uterine length was 86.17mm (IC 95%: 83.09 - 92.40) (Table 1).

Table 2. Mean values of uterine dimensions according to parity.

	nulliparous	primiparous	multiparous
Length (mm)	80.08	88.47	99.33
Width (mm)	48.02	48.84	52.43
Thickness (mm)	35.70	37.47	41.5

Table 3. Minimum, maximum and mean values of uterine length in function parity.

	Averages (mm)	VMM	VMx	Standard deviation	95% CI
nulliparous	80.08	49	105	11.72	77.97 - 82.18
primiparous	88.47	63	129	14.27	85.90 - 91.03
multiparous	99.33	65	143	22.23	95.34 - 103.31

Table 4. Minimum, Maximum and Mean Values of the Width in function of parity.

	Mean (mm)	VMM	VMx	Standard deviation	95% CI
nulliparous	48.02	23	72	9.07	46.39 - 49.64
primipare	48.84	30	69	9.77	47.08 - 50.59
multiparous	52.43	27	74	11.52	50.28 - 54.57

Table 5. Minimum, Maximum and Mean Values for Uterine Thickness in function parity.

parity	Mean (mm)	VMM	VMx	Standard deviation	95% CI
nulliparous	35.7	19	51	6.45	34.54 - 36.85
primipare	37.47	29	48	5.41	36.49 to 38.44
multiparous	41.50	21	70	10.51	39.61 to 43.38

In nulliparous women (tables 2, 3, 4 and 5), the mean values of uterine length, width and thickness in our study are respectively in the ranges 80.08mm (95% CI: 77.97 to 82.18); 48.02mm (95% CI: 46.39 to 49.64) and 35.7mm (95% CI: 34.54 to 36.85).

In multiparous women the average dimensions of our study are: 99.33 mm (95% CI: 95.34 - 103.31), 52.43 mm (IC 95%: 50.28 - 54.57), 41.5 mm (IC 95%: 39.61 - 43.38) respectively for the length, width and thickness

3.3. Association Between the Parity Dimensions of the Uterus

The mean of uterine length not different significantly between nulliparous and primiparous women ($p=0.09$) but significantly between nulliparous and multiparous women ($p=0.046$). It was lower in nulliparous women, equivalent to 88.08 mm, 88.47 mm and 99.33 mm respectively in primiparous and multiparous women. The uterine width is high in multiparous women (52.43 mm) compared to nulliparous women (48.02 mm) and 48.24 mm primiparous women. A difference in width is observed in our study only between nulliparous and multiparous ($p=0.05$).

4. Discussion

In according to our methodology performed in this study,

of uterine length was 86.17mm (IC 95%: 83.09 - 92.40) while Mauvais-Jarvis *et al* [12] reported a length within 50 and 80 mm in 1997. The mean of uterine width was 49.24 mm (95% CI: 47.45 - 51.02), it was greater than that found by Rouviere *et al* [13] in 1997 which was 40 mm. As for the average thickness of the uterus in our study, its value is between 25 to 50 mm.

In nulliparous women, the mean values of uterine length, width and thickness in our study are respectively in the ranges 80.08 mm (95% CI: 77.97 to 82.18); 48.02 mm (95% CI: 46.39 to 49.64) and 35.7 mm (95% IC: 34.54 to 36.85). Our findings were higher than of Bouton *et al*, Ardaens *et al*, Lansac *et al*, Parmar *et al* and Ohagwu *et al* [5, 6, 8, 11, 14] which were respectively 50 to 70 mm for length, 35 to 40 mm for width and 25 to 30 mm for thickness. They also softly higher than the values (72.8 ± 1.3 32.4 ± 0.1 42.8 ± 1.2 , length \times width \times anteroposterior diameter) reported by Esmaelzadeh *et al* on Iranian population [9].

In multiparous women the average dimensions of our study are: 99.33 mm (95% CI: 95.34 - 103.31), 52.43 mm (IC 95%: 50.28 - 54.57), 41.5 mm (IC 95%: 39.61 - 43.38) respectively for the length, width and thickness. In his series Bouton *et al* [5] found 75 mm, 50 mm, 30 mm for the length, width and diameter antero-posterior. Only the width value in our study is close to that of this author; the length and thickness are higher. Lansac [8] reported in 1995, 80 mm, 60 mm, 40 mm. The dimensions of width and thickness are close to our results while the length is lower. Our results were also important than of Ohagwu *et al* that were 69 ± 8 mm, 49 ± 8 mm and 41 ± 7 mm for the length, width and thickness [11]. However our values agree with the Esmaelzadeh *et al*, finding which were 90.8 ± 1.1 mm, 51.7 ± 0.7 mm, 43.0 ± 0.8 mm [9]. Similar results were reported by Parmar *et al* who found 90.7 mm x 51.9 mm x 41.4 mm for length, width and thickness [15].

In nulliparous women, the uterine length was 88.08 mm, 88.47 mm and 99.33 mm respectively in primiparous and multiparous women. This difference could be explained by the increase in uterine length during pregnancy, which would no longer accurately return to its original dimensions after one or more deliveries. Our results corroborate those found in the studies conducted by Olayemi *et al* and Esmaelzadeh *et al* [9, 16] which showed that the dimensions of the uterus increase with parity. We can then specify that the length of the uterus grows from nulliparous to multiparous. However, we did not notice a difference in length between the uterus of primiparous and multiparous women. This may suggest that the uterus does not grow very significantly in length after the first delivery.

The uterine width is high in multiparous women (52.43 mm) compared to nulliparous women (48.02 mm), but lower in primiparous women (48.24 mm). A difference in width is observed in our study only between nulliparous and multiparous ($p=0.050$). It therefore reveals that the width of the uterus of nulliparous women is smaller than that of multiparous women. On the other hand, it remains substantially the same as that of primiparous women.

In conclusion the dimensions of the non-pregnant uterus of

Beninese women were 86.17mm (IC 95%: 83.09 - 92.40) for the length, 49.24 mm (95% CI: 47.45 - 51.02) for the width and 37.42 (IC 95%: 36.02 38.81). All these dimensions increase with parity. Parity is a factor which contribute to the uterine size variation.

5. Conclusion

The dimensions of the non-pregnant uterus of Beninese women were 86.17mm (IC 95%: 83.09 - 92.40) for the length, 49.24 mm (95% CI: 47.45 - 51.02) for the width and 37.42 (IC 95%: 36.02 38.81). All these dimensions increase with parity. Parity is a factor which contribute to the uterine size variation.

Conflict of Interest Statement

All authors declare no conflict of interest.

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