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PREDICTIVE VALUE OF TRANSVAGINAL ULTRASOUND ENDOMETRIAL THICKNESS MEASUREMENT IN EVALUATION OF POSTMENOPAUSAL BLEEDING IN KANO

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ABSTRACT

Background: Postmenopausal bleeding is one of the common presentations of endometrial pathology. Transvaginal endometrial thickness, a less invasive test, can be the initial screening test for evaluating endometrial pathology in these women, in order to determine those that will require endometrial biopsy. **Aim:** The aim of this study was to determine the predictive value (validity) of transvaginal endometrial thickness measurement in the evaluation of endometrial pathology among women presenting with postmenopausal bleeding in Kano. **Methods**: It was a cross-sectional multicenter study of women with postmenopausal bleeding (PMB) that had endometrial thickness measurement using a 6.5MHZ transvaginal transducer and endometrial sample by suction curettage and subjected to histopathologic diagnosis. **Results**: Forty-five women were evaluated. The mean age of the patients was 58.2 ± 6.0 years, mean parity was 4.4 ±1.9, mean age at menopause was 51.3 ± 1.4 years and mean duration from menopause to symp tom was 6.9 ± 4.9 years. Nighteen (42.2%) of patients had endometrial hyperplasia with 10 (52.6%) being simple hyperplasia and 9 (47.4%) atypical hyperplasia. Endometrial cancer was found in 12 (26.7%) while 14 (31.1%) had normal histology. Transvaginal endometrial thickness of 5mm cut-off was found to have a sensitivity of 87.1%, specificity 50%, positive predictive value 79.4%, negative predictive value of 63.6% and diagnostic accuracy of 75.6%. **Conclusion:** Transvaginal endometrial thickness at a cut-off value of 5mm correlated well with histopathologic diagnosis of endometrial pathology. Therefore, it should be the first line test in the evaluation of women with postmenopausal bleeding in Kano.

KEYWORDS: Transvaginal, endometrial thickness, biopsy, Postmenopausal bleeding.

INTRODUCTION

Abnormal uterine bleeding occurring at any age in a woman's life is distressing and worrisome, but postmenopausal bleeding is of special concern because it is a common clinical indication of the presence of endometrial carcinoma.[1] Postmenopausal bleeding (PMB) can be defined as abnormal uterine bleeding occurring at least one year after menopause other than the expected bleeding in women taking sequential hormone replacement therapy, and its incidence can be as high as 10% in (Netherland) Europe.[2] Postmenopausal bleeding significantly impacts quality of life, results in loss of time for work, increases risk of surgical intervention including hysterectomy and ultimately impacts negatively on the health care system. It is a common problem representing 5% of all gynaecology outpatient attendance[3] and 25% of indications for gynecological surgeries in Jos, Nigeria.[3]

The differential diagnosis of postmenopausal bleeding includes endometrial polyp, endometrial hyperplasia, endometrial carcinoma, cervical cancer and uterine leiomyosarcoma.[3] It is estimated that 10–15% of patients who present with postmenopausal bleeding end up having endometrial cancer.[3]

Endometrial cancers most commonly occur in the sixth and seventh decades of life. Less than 5 % of cases are

diagnosed in women less than 40 years of age. Furthermore, it has been estimated that the risk of a woman developing endometrial cancer is 1.1% and the life-time risk of dying from it is 0.4%.[4] Therefore, early clinical evaluation of postmenopausal bleeding and prompt diagnosis of endometrial cancer will permit timely treatment and good prognosis.

Despite the advancement in the field of gynaecological oncology, there is still concern as to whether endometrial thickness measurement using transvaginal ultrasound, endometrial biopsy or both should be the initial modality of evaluation of women with postmenopausal bleeding.[5]

However, transvaginal ultrasound is a simple, cheap, readily available, and less invasive technique with high sensitivity and specificity that offers a good view of pelvic pathology, and visualization and measurement of endometrial thickness in the diagnostic workup of patients with endometrial cancer.[3] The probability of histopathologic analysis of endometrial sample diagnosing endometrial cancer in a patient who have a transvaginal ultrasound endometrial thickness of ≤ 5mm is quite negligible. Therefore, endometrial sampling is not recommended below this cut-off value.[6]

Our study aimed to determine the validity of sonographic measurement of endometrial thickness in the evaluation of endometrial pathology in women with PMB, so as to reduce unnecessary invasive procedures in these patients.

METHODOLOGY

Study Area

The study was a multicenter study conducted in Aminu Kano Teaching Hospital, Murtala Muhammed Specialist Hospital and Muhammadu Abdullahi Wase Specialist Hospital, Kano.

Study Design

It was a cross-sectional, prospective study of women who presented with postmenopausal bleeding to the gynaecology emergency and gynaecological clinics of AKTH, MMSH and MAWSH Kano.

Study Population

The study comprised of women who presented to the above units with postmenopausal bleeding and who consented to be part of the study after meeting the inclusion and exclusion criteria.

Inclusion Criteria

Postmenopausal women who gave consent for inclusion in this study and were found to be having postmenopausal bleeding during the study period (subjects).

Exclusion Criteria

Patients who declined to give consent to participate in the study, postmenopausal women on anticoagulant therapy, those with hematological or bleeding disorders and those with gross cervical lesions such as cervical polyp or cervical cancer.

Sample size determination

The minimum sample size required was determined using the statistical formula for testing sensitivity (or specificity) of a single test. Given 83% sensitivity for transvaginal ultrasound endometrial thickness in previous study, accepting a study power of 80%, confidence interval of 95%, assuming that the sensitivity for the gold standard test (biopsy) is 100% and acceptable dropout rate of 10%, a total of 45 subjects were required.

Instruments and Method of Data Collection

Structured questionnaires were administered to the patients. The questionnaire contained sociodemographic and clinical information. The information obtained consisted of identification number, age, parity, marital, educational status, socioeconomic status, religion, number of months between menopause and time of recruitment, number of weeks of postmenopausal bleeding and the time of recruitment, and phone number, Other information will include history of hypertension, diabetes mellitus, use of HRT or ART, tamoxifen, personal and family history of breast or other pelvic cancers, patient height, weight and BMI.

For the purpose of this study, postmenopausal bleeding will be any vaginal bleeding in a postmenopausal woman whose last menstrual period is at least one year (12 months) to time of the study.

Sampling Technique

Convenient sampling technique was used to select women with postmenopausal bleeding who met the inclusion criteria.

Transvaginal Ultrasound Scan

These patients were first asked to lie in supine position on an adjustable bed and preliminary trans-abdominal ultrasound examination of pelvic organs is done using trans-abdominal transducer while the patient is having a full bladder. They were then asked to empty her bladder in the toilet attached to the scanning room and subsequently put in dorsal lithotomy position with both legs in a stirrup. Transvaginal ultrasound scan was carried out using the 6.5MHz endoluminal high frequency transvaginal transducer of Mind-ray Biomedical Electronic Limited China, (Model 6CV1) by the researcher. The transducer was prepared by applying gel on it, covered with a sheath (improvised condom) with air bubble expressed out of the cover sheath. Using the non-dominant gloved hand, the labia were parted and with the gloved dominant hand, the prepared endocavitary transducer was introduced into the vaginal while ensuring that the trigger or indicator probe is facing superiorly. Once the endocavitary probe had passed through the introitus, the probe was slowly and gently advanced up the vagina. The uterine orientation

was then evaluated as well as the presence or absence of fluid in the endometrial cavity. Other pelvic organs especially the ovaries were also assessed.

Endometrial thickness was then measured at the thickest part of the endometrium in the longitudinal plane (approximately 1 cm from the endometrial–myometrial interface at the fundus) and this included both endometrial layers; from the base of the hyper-echoic (bright echo) layer of the posterior endometrium to the base of the hyper-echoic layer on the anterior endometrium as described by Granberg et al.[10] The values obtained were recorded, pictures taken and kept in the patients' folders. Other pelvic organs especially the ovaries were also assessed for abnormality. The probe were usually removed and cleaned; the patient also cleaned and allowed to come down from the examination procedure couch.

Endometrial Sampling

This was done after about 5 to 10 minutes of the transvaginal ultrasound. The Karman's syringe was assembled and charged. The patient was asked to empty her urinary bladder and then placed in lithotomy position cleaned and draped under a good light source. Bimanual examination was performed to determine the uterine size and position. Sterile disposable Cuscos speculum was inserted and the cervix displayed. The cervix was then be cleaned with providone iodine. The anterior cervical lip was held with vulsellum forceps and traction. Size 4 Karman's cannula was inserted through the os into the uterine cavity using a non-touch technique, and slowly advanced until the fundus was felt. It was then withdrawn backward 1cm and the charged Karman's syringe was then attached to the cannula. The valve on the syringe was released, to transfer the vacuum through the cannula into the uterine cavity. A 180° twisting motion was used as the cannula was moved between the uterine fundus and the internal os while making sure that at least 4 up and down excursion was made to allow adequate tissue to be taken by the cannula. The valve was then locked and the syringe disconnected from the cannula, followed by removal of the cannula. The content of the cannula was poured on sterile gauze to soak away the blood, after which blood clots was removed and the tissue sample was then placed in a labeled bottle containing 10% formalin. The vulsellum was then removed and the cervix examined for bleeding. The speculum was then removed and the patient cleaned. The patient was then briefed on the findings and given two weeks appointment to the gynaecology clinic. The sample was then taken to the histopathology laboratory for slide preparation and analysis by the pathologist, who was blinded to the transvaginal ultrasound measurement of the endometrial thickness.

Tissue Preparation and Processing

The tissue was immediately fixed with 10% of formalin in an appropriately labeled specimen container or bottle, taken to the histopathology laboratory and allowed to stand for minimum of 6 – 12 hours to allow for sufficient tissue fixation.

The formalin containing tissue was then transferred into a centrifuging test-tube containing density reagent (BD diagnostic) to remove blood clot and mucus after a two stage centrifugation at 1000 rpm for 2 minutes 15 seconds and then 2000rpm for 10 minutes 15 seconds (Rotina 465, Hettich corporation, German). The tissue was then placed in a cassette, loaded into a tissue processor for waxing and passed through series of a dehydrating and a cleaning solvent, ethanol and xylen respectively for about 5 – 10 minutes each and rinsed with water resulting in a formalin-fixed paraffin-embedded tissue block.

Tissue from the block was then sectioned thinly to 0.4 - 0.5 um size using a microtome, placed a glass slide, then stained with hematoxylin and eosin (H & E) and covered with a cover slip for examination under the microscope by the consultant pathologist. The slides was examined with both low (x 10) and high (x 40, 60) power magnifications and the diagnosis recorded.

Statistical Analysis

Data analysis was both descriptive and inferential at the 95% confidence level, using Statistical Package for Social Sciences, (SPSS version 20.0, USA, 2009). Measured variables were expressed in descriptive statistics; numeric variables were summarized using range, mean and standard deviation while categorical variables were presented in percentages. Categorical variables were compared, and tests of significance done with Chi-square. A *P*-value less than 0.05 were considered statistically significant.

Tests of validity were expressed in terms of sensitivity, specificity, predictive values and overall accuracy.

RESULTS

Eighty-four patients with postmenopausal bleeding were seen during the course of the study. Thirty- nine of these patients were excluded, 11 did not consent to participate in the study, 27 had cervical lesions (23 had cervical cancer while 4 had cervical polyp), and one patient who had history of bleeding disorder and prolonged bedside clotting time (even though may not exclude endometrial pathology but may also be reason for the bleeding). A total of 45 patients who met the inclusion criteria were recruited for this study. They all had transvaginal ultrasound scan endometrial thickness measurement and subsequently endometrial biopsy using manual vacuum aspiration system.

Table 1: Socio- Demographic and Menstrual Characteristics of the Patients.

Variable	Frequency	Percentage
Age, yrs.		
50 – 54	27	60
55 – 59	3	6.7
≥ 60	15	33.3
Parity		
0 – 4	20	44.4
≥ 5	25	55.6
Age at Menarche, yrs.		
12 – 13	31	68.9
14 – 15	14	31.1
Age at Menopause, yrs.		
< 50	2	4.4
≥ 50	43	95.6
Level of Education		
Quranic	32	71.1
Primary	8	17.8
Secondary	3	6.7
Tertiary	2	4.4
Socioeconomic Status		
Low	36	80
Middle	6	13.
High	3	6.7

The age of the patients ranged between 53 – 69 years with a mean age of 58.2 ± 6.0 years. Twenty-seven (60%) were aged 50 – 54 years, 3 (6.7%) were 55 – 59 years and 15 (33.3%) were aged 60 years and above.

The parity of these patients ranged from 1 – 7 with a mean of 4.4 ± 1.9. Low parity (0 – 4) constituted 44.4% of the study population and high parity (5 – 7) constituted 55.6%.

The age at menarche ranged between 12 – 14 years, with the mean age at menarche being 13.2 ± 0.6 years. Five (11.1%) patients attained menarche at age 12 years of age, 26 (57.8%) at age 13 while 14 (31.1%) had it at age 14.

The age at menopause of these patients ranged between 49 – 54 years with a mean of 51.3 ± 1.4 years. The menstrual span of the study population ranged between 36 – 42 years with a mean of 38 ± 1.6 years while the years since menopause (time from menopause to presentation) ranged between 3 – 16 years with a mean of 6.9 ± 4.9 years.

Majority of the patients (71.1%) had Quranic (informal) education, 17.8% primary education, 6.7% secondary education and 4.4% tertiary education. Most of the patients were of low socioeconomic class (80%), 13.3% were middle socioeconomic class, while 6.7% were of high socioeconomic class (using the protocol of social classification by Olusanya O, Okpere EE and Ezimokhai M.).[12]

Table 2: Association between Transvaginal Endometrial Thickness Measurement at a cut-off level of 5 mm and Histopathology of Endometrial Biopsy.

	Normal	Hyperplasia/Cancer	Total	Test	P- Value
	N (%)	N (%)	N (%)	χ^2	
ET mm					
< 5	7 (50)	4 (12.9)	11 (24.4)	7.186	0.007
≥ 5	7 (50)	27 (87.1)	34 (75.6)		
Total	**14 (100)**	**31 (100)**	**45 (100)**		

The table above shows that there is association between ultrasonic endometrial thickness and endometrial pathology. Twelve patients (26.7%) had endometrial cancer, 19 (42.2%) endometrial hyperplasia while 14 (31.1%) patients had normal histology. The incidence of endometrial cancer was 26.7% while that of endometrial hyperplasia was 42.2%.

Table 3: Comparison of Result of Transvaginal Endometrial Thickness with Endometrial Biopsy.

Endometrial Thickness (ET)	Endometrial biopsy		Total
	Positive Hyperplasia/Cancer	Negative No Hyperplasia/Cancer	
Positive: ET ≥ 5mm	27 (TP)	7 (FP)	34
Negative: ET < 5mm	4 (FN)	7 (TN)	11
Total	**31**	**14**	**45**

From the table above transvaginal endometrial thickness measurement was found to have a Sensitivity of (27/31) 87.1%, Specificity (7/14) of 50%, Positive Predictive Value (27/34) of 79.4% and the Negative Predictive Value (7/11) of 63.6%. The diagnostic accuracy was (7 + 27/ 45) 75.6%

Table 4: Distribution of patients with postmenopausal bleeding with endometrial Biopsy by their Risk factors.

	Normal		Hyperplasia/Cancer		Test χ^2	P- Value
	n	%	n	%		
Age, yrs.						
< 55	8	57.1	19	61.3	0.417	0.519
≥55	6	42.9	12	38.7		
Total	14	100	31	100		
Parity						
Low (0 – 4)	4	28.6	16	51.6	2.704	0.202
High (> 4)	10	71.4	15	48.4		
Total	14	100	31	100		
Menstrual span, yrs						
<40	12	85.7	24	77.4	0.415	0.520
≥40	2	14.3	7	22.6		
Total	14	100	31	100		
Years since menopause						
<8	9	64.3	20	54.5	0.000	0.986
≥8	5	35.7	11	35.5		
Total	14	100	31	100		
BMI, Kg/m^2						
< 25	6	42.9	1	3.2	11.532	0.001
≥25	8	57.1	30	96.8		
Total	14	100	31	100		
Hypertension						
Present	8	57.1	19	61.3	0.069	0.793
Absent	6	42.9	12	38.7		
Total	14	100	31	100		
Diabetes Mellitus						
Present	1	7.1	11	35.5	3.961	0.047
Absent	13	92.9	20	64.5		
Total	14	100	31	100		
Family History first degree relation						
Present	1	7.1	3	9.7	0.137	0.711
Absent	13	92.9	28	90.3		
Total	14	100	31	100		

The bivariate analysis of these patients by their risk factors as shown above revealed that body mass index (BMI) and diabetes mellitus are risk factors for endometrial pathology (endometrial hyperplasia/cancer).

Table 5: Determination of predictive variable for endometrial pathology.

		95% Confidence interval		
Variable	**Odd ratio**	**Lower level**	**Upper level**	**P- value**
BMI	4.035	-3.660	-0.045	0.045
Diabetes	2.121	-0569	3.857	0.145

The logistic regression analysis showed that the significant predictive variable for endometrial pathology was body mass index (BMI).

DISCUSSION

The study determined the predictive value of transvaginal endometrial thickness measurement in the evaluation of postmenopausal bleeding. The cut-off of < 5mm transvaginal ultrasound endometrial thickness used in this study had a sensitivity of 87.1% and specificity of 50%. This finding showed that transvaginal ultrasound endometrial thickness assessment has a high sensitivity for detecting endometrial hyperplasia/cancer and can reliably identify postmenopausal women with vaginal bleeding who are highly likely to have significant endometrial disease so that endometrial sampling may also be done at a single clinic visit if possible. This will guarantee early diagnosis and treatment.

This finding was similar to study by Breijer et al and Gupta et al in which endometrial thickness cut-off of < 5mm had sensitivity of 83% and 72%, and specificity of 83% and 77% respectively.[2,8] Also, the study by Jacobs et al showed sensitivity and specificity value of 80.5% and 85.7 respectively.[13] Thus with this high sensitivity, transvaginal ultrasound endometrial thickness assessment can be used when endometrial biopsy is not available, non-diagnostic or unsuccessful to counsel patient and make informed decision on Management.

The specificity of 50% in this study is low compared to those of the studies mentioned above because of it small sample size. This mean that transvaginal ultrasound ET < 5 mm may not be very accurate in excluding endometrial disease in some of the women with PMB. Therefore, patient who presented with PMB but have a normal ET result (ET < 5 mm) will have to be followed up and in case of recurrent or persistent bleeding should have endometrial biopsy. Gull et al and Opmeer et al in their studies concluded that women with thin endometrium (ET < 5 mm) but have recurrent or persistent PMB may need to be re-investigated with endometrial biopsy in view of the false positive rate associated with all methods of diagnosis. They also stated that there is no evidence when re-investigation with endometrial biopsy should take place and in such circumstances clinical judgment is required.[14,15]

The positive and negative predictive values of 79.4% and 63.6% in this study were similar to those found in studies conducted by Weber et al and Gupta et al with PPV and NPV of 69% and 87%; 54% and 68% respectively.[16,17] This shows that the probability of having endometrial pathology is high with transvaginal endometrial thickness of ≥ 5mm.

Endometrial thickness in this study ranged between 2.8 to 11.4mm. The study showed that transvaginal ET of ≥ 5 mm cut-off in women with PMB, is associated with endometrial histopathologic diagnosis of endometrial pathology (p-value 0.007). Therefore, transvaginal ultrasound ET assessment can identify a group of postmenopausal women who have thin endometrium (< 5 mm) and are unlikely to have endometrial hyperplasia/cancer. Endometrial sampling/biopsy is therefore not recommended below this cut-off value. Smith Bindman et al discovered that for ET values below the cuff-off < 5 mm, the probability of endometrial cancer is less than 1 percent and therefore recommend expectant management (without the need for tissue endometrial sampling) for these women.[18] Similarly Gupta et al, state that a negative result of endometrial thickness ≤ 5 mm cut-off rules out endometrial pathology with a high degree of certainty.[8]

At a cut-off value of ≥ 5 mm, we successfully detected all but one case of endometrial cancer (11 out of 12 cases). Therefore, endometrial biopsy should be performed for all patients with PMB whose transvaginal ultrasound ET value is ≥ 5mm.

The incidence of endometria cancer of 26.7% in this study is similar to the findings in studies conducted by Sharma J et al and Van Doorn et al of 21% and 23.8% respectively.[19,20] However, it is higher than 11.5% and 19.5% reported by Ferrazzi et al and Jacobs et al.[13,21] The large sample size coupled with the fact that these studies were carried out in developed countries where there are programs and interventions in postmenopausal women to mitigate the major risk factors for endometrial cancer could have accounted for the low incidence. Also, the different population studied could have been responsible for the difference in the incidences. Considering the high incidence of endometrial cancer in this study, patients with PMB should be promptly referred for transvaginal ultrasound endometrial thickness assessment and those with abnormal results should have endometrial biopsy. This has also been supported by recommendation from international bodies as it has been found to guarantee early diagnosis and treatment.[22,23]

In this study, the socio-demographic characteristics showed that the mean age of postmenopausal women who presented with PMB was 58.2 ± 6.0 years with the range of 53 – 69 years. This was similar to the studies conducted by Russel et al and Von Doorn et al, both of which reported a mean age of 62 years, but lower than the 64 years reported by Van Den Bosch et al and Yakasai et al.[24,25,26,27] The difference could be due to the variation in average life expectancy and improved health care in those countries compared to my study population.

The study showed that 44.4% of the patients were of low parity (0 – 4). This is similar to the finding in the study conducted by Singh et al in which patients with low parity accounted for 40%,[28] but much lower than that reported by Viswanathan and colleagues who found out that 76.7% of their patients were between para 2-3.[29] However, low parity being a risk factor for endometrial cancer was not found to be significantly associated in this study.

It was also shown in this study that most of the women belong to the low socio-economic class (80%) as per Odusanya, Okpere and Ezimokhai social scale.[12] Similar results were also found in study conducted by Viswanathan et al and Sharma et al.[19,29] This finding could have been due to the fact that the study was conducted among the populace where culturally the women are full-time housewives with low level of education which is a key factor in social stratification in terms of employment and income generation.

In this study, 20% of the patients had menstrual span ≥ 40 years. This is similar to the finding in the study conducted by Pattersson et al.[30] Menstrual span has been identified as one of the risk factors for endometrial cancer. However, it has not been found to be significantly associated in this study.

The mean number of years since menopause (duration of menopause) in this study was 6.93 ± 4.9 which differs from the study by Van Den Bosch et al that reported 13.39 ± 8.0.[26] The difference could have been due to reduced life expectancy in this part of the world. Another reason could be due to the fact that most of the present study population are illiterate and may have recall bias about their date of birth, menarche and age at menopause.

The study revealed that 84.4% of these women had BMI ≥ 25Kg/m^2 which agreed with the study conducted by Rusell M et al where 96.7% had BMI ≥25KSSg/m^2.[31] However, this was higher than 29% obtained in the study by Sharma et al.[19] The difference could be due to variation in nutrition and environment factors as Sharma's study population were mountain dwellers who also engaged in strenuous physical work unlike the population in this study who were mostly house wives. Also BMI ≥ 25Kg/m^2 was found to be the most significant predictor of endometrial pathology in the study subjects. Therefore, special consideration should be given to overweight/obese patients presenting with PMB (ensuring they have both transvaginal ultrasound scan of ET and endometrial biopsy at a single clinic visit / one stop clinic); also programs and interventions that will help to reduce incidence of obesity in peri/postmenopausal women will invariably reduce incidence of endometrial cancer.

This study also showed that majority of these women had hypertension (60%) which agreed with the finding by Sharma J et al.[39] It is not surprising as hypertension is a disease of advancing age. However it was not significant. Furthermore, 26.7% of the study subjects had diabetes which was in agreement with that by Singh et al but low compared to 48% that was found in the study by Wiswanathan M et al.[32,33] The difference could have been due to higher prevalence of type 2 diabetes mellitus among Asian population. Despite this difference, there was association between diabetes and histopathology of endometrial biopsy among this study population with PMB with p-value 0.001. However, from the logistic regression analysis this association was not significant (p-value 0-045).

In addition to the high predictive value (test of validity) of transvaginal endometrial thickness measurement in this study, other important factors (WHO properties of a good screening test in relation to biopsy) that was discovered and need to be emphasized while using transvaginal ET assessment as a screening test in these patients are cost, simplicity of procedure, infrastructure requirement and manpower need; duration of test and availability of result for timed decision making and appropriate intervention, especially in our environment with poor health sector financing, dearth of manpower and infrastructure, and competing health needs. Furthermore, when the risk of unnecessary biopsy is weighed against the above advantages of TVS ET measurement, its use as first line test in the evaluation of PMB would be worthwhile and cost effective especially in developing countries.

Therefore, women with postmenopausal bleeding with endometrial thickness of ≥ 5mm should have endometrial biopsy to confirm diagnosis. Thin endometrial measurement (< 5 mm) on transvaginal ultrasound scan can exclude endometrial pathology in postmenopausal women.

CONCLUSION

Transvaginal ultrasound endometrial thickness cut-off value of ≥ 5 mm (with this high sensitivity) can be used when endometrial biopsy is not available, non-diagnostic or unsuccessful to make an informed decision on management plan for women with PMB.

Furthermore, body mass index is a significant predictor of endometrial pathology in postmenopausal women with PMB and therefore obese postmenopausal women should have regular transvaginal endometrial thickness evaluation.

Consent to participate

Written informed consent was obtained from each participant in the study

Ethical approval

This study had ethical approval from Kano State Ministry of Health (with number: MOH/Off/797/T.I/686

Competing interests

Nil.

Authors' contributions

Contributed equally.

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