



(RESEARCH ARTICLE)



## Sonographic evaluation of abnormal uterine bleeding among non-pregnant women in Lagos, Southwest, Nigeria

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### Abstract

Abnormal uterine bleeding (AUB) is the direct cause of a significant healthcare burden for women and society at large. Around 30% of women will experience AUB during their reproductive years, prompting them to seek medical attention. Abnormal Uterine Bleeding can significantly impact their quality of life, often causing frequent work absences and potentially requiring surgical treatment. It's crucial to accurately diagnose the underlying cause of AUB in this age group to ensure proper and effective management. This study aims to evaluate AUB among non-pregnant women in Lagos using transvaginal ultrasound. A descriptive cross-sectional study of 152 non-pregnant women of reproductive age (16 to 55 years) with abnormal uterine bleeding for a period of five months. A purposive sampling technique was used to recruit the subjects. Data was analysed using SPSS version 20.0. Sonographic evaluation reveals positive findings in 97 cases (63.8%) out of 152 cases studied. Seventy cases (46%) had structural abnormalities with the highest being Leiomyoma (41.4%), followed by Adenomyosis (3.9%), and Endometrial Polyp (0.6%). The age group 26 – 35 years presented most with abnormal uterine bleeding cases (48.6%). The major clinical history was absent menstrual bleeding with findings depicting normal endometrium. There was a positive and moderate correlation between age and parity of subjects with AUB.

The study found that Transvaginal ultrasound effectively identifies AUB's structural causes. It is recommended as the initial assessment method due to its safety, affordability, and widespread availability in healthcare settings.

**Keywords:** Abnormal uterine bleeding; Transvaginal ultrasound; Leiomyoma; Adenomyosis, Endometrial polyps

### 1. Introduction

About one-third of the outpatient gynaecological visits and referrals for ultrasound investigations are due to abnormal uterine bleeding[1]. Abnormal uterine bleeding accounts for more than 70% of all gynaecologic consults in perimenopausal and postmenopausal years [2] and in 30% of women during their reproductive years.[3] Abnormal uterine bleeding (AUB) is a variation from the normal menstrual cycle and includes changes in regularity, frequency of menses, duration of flow, or the amount of blood loss. Abnormal uterine bleeding can also be categorized and further subdivided based on the volume of menstruation, regularity, frequency, duration, chronicity, and timing related to reproductive status [4]. Any significant deviation from a woman's established menstrual cycle is considered abnormal uterine bleeding. This can manifest as bleeding between menstrual periods (metrorrhagia), irregular cycle length with or without varying durations and amounts of bleeding (menometrorrhagia), an increased frequency of bleeding episodes (polymenorrhea), or a reduced number of bleeding episodes (oligomenorrhea). Additionally, abnormal uterine bleeding often involves an increase in blood volume during menstruation, a condition known as menorrhagia[5]. Abnormal uterine bleeding is a common and debilitating condition and a direct cause of a significant healthcare burden

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for women, their families, and society as a whole [3]. Women with abnormal uterine bleeding in whom no clear aetiology can be identified are diagnosed as having dysfunctional uterine bleeding; which is a diagnosis of exclusion and can only be made after pregnancy, iatrogenic causes, systemic conditions and obvious genital tract pathology have been ruled out [6].

The existing terminology used in medical and historical literature to describe menstrual bleeding lacks consistency and can be confusing. To enhance effective communication among healthcare practitioners, it is crucial to establish standardized universal terminology when addressing Abnormal Uterine Bleeding (AUB). This standardization is essential for guiding research and education in the field [7]. As a result, the International Federation of Gynecology and Obstetrics (FIGO) Menstrual Disorders Working Group, an international expert consensus committee, has developed new terminology guidelines for AUB [8]. The suggested nomenclature for AUB seeks to simplify the descriptions of this clinical presentation and eliminate terms such as menorrhagia, metrorrhagia, and dysfunctional uterine bleeding. The terminology endorsed by the FIGO Menstrual Disorders Working Group consensus statement [8] is based on four parameters that describe variations in AUB as follows: volume - which can be heavy, normal or light; regularity - which can be irregular, regular or absent; frequency - which can be frequent, normal or infrequent; and duration of flow - which can be characterized as prolonged, normal or shortened. Other forms of abnormal bleeding include intermenstrual bleeding, premenstrual bleeding and breakthrough bleeding.

Transvaginal ultrasound is the preferred method for evaluating AUB due to several advantages over other alternative diagnostic approaches. The hormonal assay is costly, and endometrial biopsies are highly invasive. In contrast, transvaginal ultrasound is non-invasive, relatively cost-effective, affordable for patients, and provides information about both the uterus and ovaries.

A woman's menstrual cycle serves as a vital sign of her overall health and well-being. Normal menstrual bleeding indicates good health and the absence of uterine pathology [9]. However, menstrual disorders are a common reason for medical consultations among reproductive-age women, affecting up to 30% of women during their reproductive years [10]. Abnormal uterine bleeding is reported in 9 to 14 per cent of women between menarche and menopause, leading to financial burden and reduced quality of life [11]. The World Health Organisation has noted that 18 million women aged 30 to 55 years perceive their menstrual bleeding as excessive, resulting in healthcare costs [12]. Abnormal uterine bleeding hurts quality of life, often leading to missed workdays, surgical interventions like hysterectomy, and significant strain on health care systems.

The study aims to evaluate abnormal uterine bleeding among non-pregnant women using transvaginal ultrasound at Lagos University Teaching Hospital (LUTH) in Lagos, southwest, Nigeria. The research will provide insight into current opinions on abnormal uterine bleeding and adopted nomenclature. It will also investigate the most common age group affected by abnormal uterine bleeding and assess structural abnormalities that contribute to this condition in women. Additionally, the study aims to establish relationships between parity and the age of women with abnormal uterine bleeding, evaluate ultrasound findings based on age groups, and determine associations between clinical history and sonographic findings. The research will facilitate improved communication between referring clinicians and sonographers. and help sonographers tailor ultrasound techniques based on patient age while promoting the use of transvaginal ultrasound for accurate diagnoses.

The study was conducted in the Radiodiagnosis Department of Lagos University Teaching Hospital, Lagos, southwest Nigeria, among women experiencing abnormal uterine bleeding from September 2018 to January 2019.

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## **2. Material and methods**

A descriptive cross-sectional study was conducted at the Radiodiagnosis Department, Lagos University Teaching Hospital (LUTH), Lagos State, southwest, Nigeria. Lagos is a state located in the southwestern geopolitical zone of Nigeria, approximately on longitude 20 42'E and 32 2'E respectively, and between latitudes 60 22'N and 60 2'N.

### **2.1. Population of the study**

The study was conducted among non-pregnant women who visited the gynaecology department at Lagos University Teaching Hospital (LUTH), with clinical indications of abnormal uterine bleeding from September 2018 to January 2019.

### **2.2. Sampling Technique**

A purposive sampling technique was used as subjects who met the inclusion criteria were recruited for this study.

### 2.3. Sample size determination

The sample size was calculated using the formula developed by Yamane and used by Elugwu *et al.* (2023).

$$= \frac{N}{1 + N(e)^2}$$

Where  $n$  is the sample size,  $N$  is the population size and  $e$  is the level of precision (0.05).

The average number of gynaecologic visits within five (5) months in the study centre (LUTH) was eight hundred and twenty (820). According to Singh *et al.*, 2013 which states 30% of gynaecology visit of women of reproductive age was due to abnormal uterine bleeding, the population of patients with abnormal uterine bleeding during the 5-month duration of the study was estimated as;

$$\begin{aligned} \text{Sample Population} &= 30\% (\text{Singh } et al., 2013) \times 820 (\text{new gynaecology visits for 5-months}) \\ &= 30/100 \times 820 \\ &= 246 \end{aligned}$$

Thus, the sample population (N) of women with abnormal uterine bleeding was estimated at 246.

According to Yamane and Elugwu *et al* (2023) formula above; inputting the values,

$$\begin{aligned} \text{Sample size, } n &= \frac{246}{1 + 246 (0.05)^2} \\ n &= \frac{246}{1 + 0.615} \\ n &= 152.32 \approx 152. \end{aligned}$$

### 2.4. Ethical approval

By the Helsinki Declaration, ethical approval was obtained from the Health Research and Ethical Committee of Lagos University Teaching Hospital (LUTH), Lagos

### 2.5. Informed consent

Informed consent was obtained from all participants. The significance and objectives of the study were clearly explained, they were assured of the confidentiality of the data obtained and the right to withdraw from the study at any time.

### 2.6. Inclusion criteria

All non-pregnant women with clinical indications of abnormal uterine bleeding, referred for pelvic transvaginal ultrasound at the Radiodiagnostic Department of Lagos University Teaching Hospital, Lagos and who gave informed consent were included in the study.

### 2.7. Exclusion criteria

Pregnant women with vaginal bleeding or spotting, women on hormonal contraceptive use, women with clinical symptoms of pelvic infection, women with Postmenopausal bleeding, and women who refused to give consent.

### 2.8. Data collection instrument

All ultrasound scans were performed using E-CUBE 5 (2005) and Toshiba Model UIDM-580A with 3.5MHz and 6.5MHz curvilinear and endovaginal transducers. A data capture sheet was drafted for the documentation of data.

## 2.9. Data collection procedure

The patients selected for the study received counselling regarding the examination procedure. They were then asked to change into an examination gown and lie down in a supine position. Ultrasound gel was applied to the suprapubic area for the transabdominal ultrasound, which provided a panoramic view of the uterus. Subsequently, patients were instructed to fully empty their urinary bladder. Following this, patients assumed a supine position with their legs flexed (lithotomy position) for the transvaginal ultrasound. A pillow was placed under the gluteal region to facilitate the manipulation of the transducer.

For the transvaginal ultrasound, the transducer was coated with gel and covered with a sterile barrier. The transducer was gently inserted into the vagina, with the patient appropriately covered throughout the procedure except during the insertion when direct visualization was necessary. Both sagittal and transverse views of the uterus were obtained using various scanning techniques, including scanning, panning, and fanning. The examination focused on assessing the size, shape, and contour, as well as the appearance of the myometrium, endometrium, and cervix. The ovaries were examined for their echogenicity and position, with any masses or abnormalities carefully evaluated for their origin, echotexture, size, shape, and relationship to adjacent structures. Lastly, the cul-de-sac was examined for the presence of any fluid.

## 2.10. Method of Data Analysis

Data collected were analysed using Microsoft Excel 2013 version and Statistical Package for Social Sciences version 20. Frequency, percentage, mean and standard deviation were used to analyse patients' demographics such as age and parity. Frequency and percentage were used to analyse the clinical history and ultrasound findings. Pearson correlation was used to show the relationship between parity and age of women with abnormal uterine bleeding. A frequency table was used to analyse the ultrasound findings based on the age group of patients. The Pearson correlation coefficient was used to show the relationship between clinical history and ultrasound findings.

## 3. Results

A total of one hundred and fifty-two (152) women with a clinical history of abnormal uterine bleeding were included in this study.

Table 1 shows that the mean age  $\pm$  SD of subjects included was  $33 \pm 7.30$  years. The age range of 17 – 51 years was evaluated with 27 patients from the age group 16 – 25 years, 73 patients from the age group 26 – 35 years, 44 patients from the age group 36 – 45 years and 8 patients from the age group of 46 – 55 years. The incidence of AUB was highest within the age group 26 to 35 years with 73 cases (48.0%) and least among 46 – 55 years with 8 (5.3%).

Table 2 shows the parity distribution of patients, the highest cases of 66 (43%) were nulliparous and the least parity being 4 cases (2.6%) was parity V. This incidence is also commonest among nulliparous 66 (43.2%) followed by parity II 29 (18.4%).

Table 3 shows that, out of forty (40) patients who presented with heavy menstrual bleeding, fourteen (14) of them had associated prolonged menstrual bleeding. Thirty-two patients (21%) had a clinical history of absent menstrual bleeding followed by twenty-six patients (17.1%) with heavy menstrual bleeding. The least clinical indication was patients with infrequent menstrual bleeding (0.6%).

**Table 1** Distribution of patients according to age

Age Group (yrs)	Frequency	Percentage (%)	Mean age $\pm$ SD
16 – 25	27	17.7%	23.27 $\pm$ 2.245
26 – 35	73	48.0%	30.55 $\pm$ 2.900
36 – 45	44	30.0%	39.77 $\pm$ 2.589
46 – 55	8	5.3%	48.87 $\pm$ 1.615

**Table 2** Distribution of patients according to parity

Parity	Frequency	Percentage (%)
0	66	43.0%
I	21	13.8%
II	28	18.4%
III	23	15.1%
IV	10	6.6%
V	4	2.6%

**Table 3** Distribution of Patient's clinical history

Clinical History	Frequency	Percentage (%)
Absent Menstrual Bleeding	32	21.0
Frequent Menstrual Bleeding	5	3.3
Heavy Menstrual Bleeding	26	17.1
Heavy and Prolonged MB	14	9.2
Inter Menstrual Bleeding	8	5.2
Infrequent Menstrual Bleeding	3	1.9
Irregular Menstrual Bleeding	23	15.1
Prolonged Menstrual Bleeding	20	13.1
Shortened Menstrual Bleeding	21	13.8
Total	152	100%

Table 4 shows the distribution of ultrasound findings in the uterus. Abnormal ultrasound findings in the uterus were noted in 97 (63.8%) patients, with 70 (46.1%) having structural abnormalities while other non-structural findings accounted for 27 cases (17.8%). Fifty-five 55 (36.2%) patients had no structural abnormalities seen in the uterus during evaluation.

Table 5 shows the relationship between parity and the age of the patient. The parity is highest at 26 – 35 years and slows down at 36 – 45 years after which there is a decline in the parity with age. Whereas the incidence of abnormal uterine bleeding was high among the nulliparous 66 (43.2%) and low among the parity IV (5.1%) and V (3.8%). The correlation between age and parity of patients with AUB was calculated. There is a positive and moderate correlation between age and parity of women with abnormal uterine bleeding and this is supported by Pearson's correlation of 0.577 at a p-value of 0.01 level.

Table 6 shows ultrasound findings according to age group. The majority of the findings were among the 26 – 35 years and then 36-45 years. Thirty-one (31) patients in the 26 -35 years age group had uterine myoma, twenty-five (25) in the 36 – 45 years age group had uterine myoma and only one (1) patient had uterine myoma among 16 – 25 years.

Table 7 shows an association between clinical history and ultrasound findings. Normal endometrium/uterus was significantly associated with absent menstrual bleeding with 21.0% (32 cases) of patients who reported absent menses, and 12.5% (19 cases) had normal uterus/endometrium. Also, out of 15.1% who reported irregular menses, 7.9% had a normal uterus, 13.8% (21 cases) reported shortened menstrual bleeding, and 7.2% had a normal uterus. 39.5% (60 cases) of heavy, prolonged and heavy/prolonged had 25.6% (39 cases).

There is a positive but weak association between clinical history and sonographic findings and this is supported by Pearson’s correlation  $r = 0.197$  and statistical significance at  $p < 0.05$ .

**Table 4** Ultrasound findings

Ultrasound Findings	Number of cases (Percentage %)
Normal Uterus/findings	55 (36.2%)
Uterine Myoma	63 (41.4%)
Adenomyosis	6 (3.9%)
Endometrial Polyp	1 (0.6%)
Others non-structural findings	27 (17.8%)

**Table 5** Relationship between parity and age of patient

Parity	16 - 25	26 - 35	36 - 45	46 - 55	Total	Correlation (r), p-value
0	21 (13.8%)	35 (22.9%)	8 (5.2%)	2 (1.3%)	66 (43.2%)	$r = 0.577, p = 0.05$
I	2 (1.3%)	12 (7.8%)	7 (4.6%)	0 (0.0%)	21 (13.7%)	
II	2 (1.3%)	19 (12.4%)	8 (5.2%)	0 (0.0%)	29 (18.9%)	
III	1 (0.6%)	8 (5.2%)	14 (9.2%)	0 (0.0%)	23 (15.0%)	
IV	0 (0.0%)	0 (0.0%)	5 (3.2%)	3 (1.9%)	8 (5.1%)	
V	0 (0.0%)	0 (0.0%)	3 (1.9%)	2 (1.9%)	5 (3.8%)	
Total	26 (17.1%)	74 (48.6%)	45 (29.6%)	7 (4.6%)	152 (100.0%)	

**Table 6** Ultrasound Findings as per Age Group

ULTRASOUND FINDINGS	AGE GROUPS				
	16 - 25	26 - 35	36 - 45	46 - 55	Total
Uterine Myoma	1	31	25	6	63
Adenomyosis	0	1	5	0	6
Endometrial Polyp	0	0	1	0	1
<b>Total</b>	<b>1</b>	<b>32</b>	<b>31</b>	<b>6</b>	<b>70</b>

**Table 7** Association between Clinical History and Ultrasound Findings

Clinical History	Sonographic findings				Total
	Normal Uterus	Uterine Myoma	Adenomyosis	Endometrial polyp	
Irregular	12	8	1	0	21
Infrequent	2	1	0	0	3
Shortened	11	7	0	0	18
Absent	19	5	1	0	25
Heavy	2	20	1	0	23
HMB/PMB	0	8	2	0	10
Prolonged	4	11	0	0	15
Frequent	2	1	1	1	5
Inter	3	2	0	0	5
Total	55	63	6	1	125

#### 4. Discussion

In this study, a total of 152 patients participated, and their data were analysed. The majority of patients with abnormal uterine bleeding fell within the age group of 26 to 35 years. This age range corresponds to a period when women are particularly concerned about their menstrual health due to its association with fertility and childbearing. Conversely, there was a rare occurrence of cases among patients aged 46 to 55 years. This could be attributed to the approaching menopausal stage (climacteric period) when women tend to be less concerned about their menstrual health due to age and reduced expectations of fertility. Another possible reason for this finding could be that patients in this older age group were evaluated and treated earlier, reducing the incidence in later age groups. This contrasts with the findings of Adedokun et al., where the most common age group was 35 to 46 years. The difference may be because Adedokun et al. focused solely on leiomyoma as a cause of abnormal uterine bleeding, excluding other categories included in this study. Additionally, it contrasts with Doraiswami et al., where the most common age group was 41 to 50 years, likely because their study population was in the perimenopausal age range.

Structural abnormalities causing abnormal uterine bleeding were evaluated in this study based on the FIGO PALM COEIN classification. Approximately one-third of cases showed no structural causes or displayed normal endometrial patterns, including proliferative, secretory, and atrophic phases. Proliferative phase bleeding may result from anovulatory cycles, while secretory phase bleeding may be due to ovulatory dysfunction and this finding aligns with Choudhary et al. The most common structural abnormality observed was leiomyoma, consistent with several other studies, such as those conducted by Pillai and Verma et al.

The occurrence of Adenomyosis cases in this study is in line with the findings of Choudhary et al. However, it contrasts with the findings of Jonathan et al., where fewer Adenomyosis cases were reported. This difference may be attributed to the age range and racial differences in the populations studied. Endometrial polyps were observed in only one patient, consistent with the study by Critchley et al. Similarly, Dreisler et al. found few cases of polyps, particularly among premenopausal women. The study revealed that polyps significantly correlate with advancing age. The lower incidence of endometrial polyps in younger age groups may be due to spontaneous regression mechanisms characteristic of the cycling endometrium in the reproductive age group. No cases of endometrial hyperplasia were recorded in this study, possibly because most patients belonged to younger age groups and were in a premenopausal state. Additionally, the prevalence of risk factors such as diabetes, obesity, and a sedentary lifestyle was low among this population.

A positive and moderate correlation was found between the age and parity of subjects with abnormal uterine bleeding. As the patient's age increased, there was a corresponding increase in parity and the occurrence of abnormal uterine bleeding. The major structural abnormalities were observed among patients with parity II and in the age group of 26 to 35 years. This finding is consistent with Pillai's 2014 findings. However, a majority of patients with leiomyoma as a finding of AUB were nulliparous and of increased age, as reported by Ezeama et al. This contrast with Ezeama et al.'s findings may be attributed to differences in marriage age between patients from the eastern and western regions of Nigeria, where parity II was more common among the patients studied, while nulliparity was more common in the eastern region.

Significant positive ultrasound findings were most common among the age group of 26 to 35 years, followed by the age group of 36 to 45 years. Uterine myoma was the most common pathology, followed by adenomyosis. There was an increase in the occurrence of abnormal uterine bleeding from the twenties, with a decline observed from the late fifties. The age group with positive findings aligns with the majority of previous studies, such as those conducted by Choudhary et al. and Adedokun et al. Therefore, evaluating patients aged 26 to 45 years for structural abnormalities causing abnormal uterine bleeding is crucial, as significant positive findings were recorded within this age range. No significant positive ultrasound findings were noted among younger age groups, possibly because their AUB symptoms may be attributed to ovarian dysfunction.

A positive but fair correlation was found between clinical history and ultrasound findings. The most common clinical history associated with AUB was absent menstrual bleeding, which is not surprising, as this age group may experience hypothalamus-pituitary-ovarian axis immaturity and fluctuations, leading to non-structural causes like endometritis and ovulatory dysfunction. Heavy menstrual bleeding was the most common presentation clinically and was significantly associated with leiomyoma on ultrasound, consistent with studies by Pillai, Doddamani et al., Verma et al., and Jonathan et al. In cases presenting with heavy or prolonged menstrual bleeding, leiomyoma and adenomyosis were the most common findings. This finding aligns with Adedokun et al., where uterine myoma was significantly associated with heavy, prolonged, or heavy/prolonged menstrual bleeding. Adenomyosis was significantly associated with heavy/prolonged menstrual bleeding, consistent with Jonathan et al. Only one subject with frequent menstrual bleeding was found to have an endometrial polyp, similar to Dreisler et al.'s findings in premenopausal women. However, contrary to this study, Dreisler et al. reported that most patients with endometrial polyps did not present with frequent bleeding, possibly due to asymptomatic polyps. This demonstrates that clinical history does not always determine the exact structural pathology.

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## 5. Conclusion

In summary, the sonographic evaluation revealed positive findings in 97 out of 152 cases studied, accounting for 63.8% of the total cases. Among reproductive-age women, 70 cases (46%) exhibited structural abnormalities, with leiomyoma being the most common at 63 cases (41.4%), followed by adenomyosis at 6 cases (3.9%), and endometrial polyp at 1 case (0.6%). The age group of 26 to 35 years had the highest incidence of abnormal uterine bleeding, with 74 cases (48.6%), while nulliparous women showed a high incidence of 66 cases (43.2%). This could be attributed to findings in the adnexa and Pouch of Douglas, as well as the observation of a normal uterus.

Based on this study, we conclude that ultrasonography is a convenient and relatively cost-effective method for initially identifying various causes of abnormal uterine bleeding. It demonstrates high diagnostic accuracy in detecting endometrial lesions, structural factors contributing to abnormal uterine bleeding and associated pathologies.

Therefore, it is recommended that all cases of abnormal uterine bleeding undergo assessment with transvaginal ultrasound, and further evaluation should be tailored to the individual's presenting complaints and age. Top of Form

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## Compliance with ethical standards

### *Acknowledgement*

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### *Disclosure of conflict of interest*

There is no conflict of interest associated with this study.



### *Statement of ethical approval*

This study has received ethical approval from the Lagos University Teaching Hospital Health Research Ethics Committee, with the assigned number: ADM/DCST/HREC/2056.

### *Statement of informed consent*

Informed consent was obtained from all participants who were included in this study.

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### Author's short biography

	<p><b>Tawakalt Opeyemi Olagunju-Moshood</b> is a highly proficient senior Radiographer who specializes in Sonography and has a profound interest in women's health and fertility treatment. She holds a B.Sc (Hons) Degree in Radiography and a postgraduate Diploma in Sonography, amassing nearly a decade of valuable experience in this field. She is renowned for her meticulous attention to detail and unwavering commitment to medical protocols.</p>
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