Endometrial Thickness and Histopathological Findings in Perimenopausal Women with AUB

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Abstract

Background: *Abnormal uterine bleeding (AUB) is a common and distressing complaint in perimenopausal women, with causes ranging from benign hormonal imbalances to pre-malignant and malignant endometrial pathologies. Endometrial thickness (ET) measurement by transvaginal ultrasonography (TVS) is widely used as a non-invasive screening tool to guide management decisions.*

Aim of the study: *The aim of this study was to evaluate the association between endometrial thickness and histopathological findings in perimenopausal women presenting with AUB.*

Methods: *This observational cross-sectional study was conducted in the Department of Obstetrics and Gynaecology, Dhaka Medical College Hospital, Dhaka, Bangladesh from July 2024 to June 2025. Total 120 perimenopausal women presenting with AUB were included in the study.*

Results: *In this study, most were aged between 45-49 years (43.3%), overweight (38.3%), or obese (25.0%). Heavy menstrual bleeding was the commonest symptom (51.7%). Mean endometrial thickness (ET) was 9.8 ± 3.8 mm, with the majority (26.7%) between 9-11 mm. Proliferative endometrium was the most frequent histopathology (33.3%), followed by hyperplasia without atypia (21.7%), secretory (15.0%), polyps (11.7%), hyperplasia with atypia (10.0%), and carcinoma (8.3%). Mean ET was highest in carcinoma (15.2 mm). ET ≥11 mm showed increased rates of hyperplasia and carcinoma, whereas ET <5 mm was associated only with benign findings, highlighting the diagnostic value of ET measurement.*

Conclusion: *In conclusion, transvaginal ultrasonographic measurement of endometrial thickness serves as a valuable initial screening tool in perimenopausal women with abnormal uterine bleeding.*

Keywords: *Endometrial Thickness, Abnormal Uterine Bleeding, Perimenopause, Histopathology, and Transvaginal Ultrasonography.*

1. INTRODUCTION

Abnormal uterine bleeding (AUB) is one of the most common gynaecological complaints among perimenopausal women worldwide, significantly impacting their quality of life, social functioning, and healthcare burden.[1,2]

Defined as bleeding from the uterine corpus that is abnormal in volume, regularity, or timing and occurs in the absence of pregnancy, AUB affects approximately 10-30% of women attending gynaecology outpatient departments globally.[3] In perimenopausal women, the prevalence is even higher due to underlying hormonal fluctuations and anovulatory cycles.[4] Perimenopause represents the transitional period before menopause, typically beginning in women during their 40s, characterised by declining ovarian follicular activity, erratic gonadotropin secretion, and consequent menstrual irregularities.[5] During this phase, estrogen levels may remain normal or elevated while progesterone production declines

due to anovulatory cycles, leading to unopposed estrogenic stimulation of the endometrium and resultant endometrial proliferation or hyperplasia.[6] The differential diagnosis spectrum of AUB in perimenopausal women is broad, encompassing benign, pre-malignant, and malignant pathologies. Benign causes include hormonal imbalance due to anovulation, endometrial polyps, leiomyomas, and endometritis, while pre-malignant conditions such as endometrial hyperplasia with atypia and malignant conditions like endometrial carcinoma remain critical considerations due to their impact on morbidity and mortality.[7,8] Studies indicate that while benign causes predominate, a small but significant proportion of perimenopausal AUB cases are attributable to hyperplasia or carcinoma, warranting prompt evaluation.[9] Transvaginal ultrasonography (TVS) serves as a first-line, non-invasive, cost-effective imaging modality for assessing the endometrial cavity in women presenting with AUB. Measurement of endometrial thickness (ET) by TVS aids in risk stratification for endometrial pathology, guiding decisions on the need for histopathological sampling.[10,11] Recent studies have attempted to establish optimal ET cut-offs to predict significant endometrial pathology in perimenopausal women. Kumari et al.[10] reported that an ET cut-off greater than 11 mm was associated with increased risk of endometrial hyperplasia or carcinoma. Similarly, Sajjad et al.[12] suggested a cut-off of ≥12 mm for predicting significant pathology. However, while TVS ET measurement has demonstrated good sensitivity, its specificity remains variable, and overlaps exist between benign and malignant conditions.[13] For instance, benign conditions such as polyps or submucous fibroids may also present with thickened endometrium on TVS, leading to false-positive results.[7] Due to these limitations, histopathological examination of endometrial samples obtained through biopsy or curettage remains the gold standard for definitive diagnosis and further management planning.[13,14] Histopathology not only confirms the presence or absence of malignancy but also provides insights into the spectrum of endometrial changes, including proliferative, secretory, atrophic, hyperplastic, and neoplastic patterns.[15] Despite its diagnostic importance, histopathological evaluation is invasive, resource-intensive, and may not be feasible for all patients in low-resource settings, thereby necessitating accurate non-invasive triaging tools such as TVS. Notably, limited regional data exist correlating ET measurements with histopathological findings specifically among perimenopausal Indian women, despite their unique sociodemographic, reproductive, and metabolic profiles compared to Western cohorts.[15] this knowledge gap hampers the development of locally relevant risk stratification protocols and contributes to either under- or over-investigation of perimenopausal AUB in clinical practice. The present study was undertaken to evaluate the association between endometrial thickness measured by transvaginal ultrasonography and histopathological findings in perimenopausal women presenting with abnormal uterine bleeding.

2. OBJECTIVES

To evaluate the association between endometrial thickness and histopathological findings in perimenopausal women presenting with abnormal uterine bleeding (AUB).

3. METHODOLOGY

This observational cross-sectional study was conducted in the Department of Obstetrics and Gynaecology, Dhaka Medical College Hospital, Dhaka, Bangladesh from July 2024 to June 2025. Total 120 perimenopausal women presenting with abnormal uterine bleeding (AUB) were included in the study. Perimenopause was defined as the period immediately prior to menopause during which endocrine and biologic changes begin, typically 40-55 years of age. Women with known coagulation disorders, thyroid dysfunction, or on hormonal therapy were excluded. After obtaining informed written consent, all participants underwent detailed history taking and thorough clinical examination. Transvaginal ultrasonography (TVS) was performed in all cases to measure endometrial thickness (ET), defined as the maximal double-layer thickness in the longitudinal plane. Subsequently, endometrial sampling was carried out using pipelle biopsy or dilatation and curettage under aseptic precautions. The samples were sent for histopathological examination in the hospital pathology laboratory, and findings were categorized into benign, pre-malignant, or malignant pathologies. The primary objective was to assess the association between ET measurements and histopathological outcomes in perimenopausal AUB. Data were analysed using SPSS software version 26, with continuous variables presented as mean ± SD and categorical variables as frequencies and percentages. Chi-square test and ROC curve analysis were performed to determine the diagnostic performance and optimal cut-off values of ET for

predicting significant endometrial pathology, with p < 0.05 considered statistically significant.

4. RESULT

Table I illustrates the demographic and clinical characteristics of the study participants. Among the 120 perimenopausal women evaluated, the largest proportion belonged to the 45-49 years age group comprising 43.3%, followed by 25.0% in the 50-54 years group, 23.3% in the 40-44 years group, and 8.3% aged 55 years and above. Regarding body mass index (BMI), 38.3% were overweight (25-29.9 kg/m²) while 25.0% were obese (≥30 kg/m²). Approximately one-third (33.3%) had normal BMI, and only 3.3% were underweight. Analysis of parity showed that 41.7% of women were para 3-4, followed by 33.3% para 1-2, 15.0% with parity ≥5, and 10.0% were nulliparous. In terms of presenting symptoms demonstrated in figure 1, heavy menstrual bleeding was the most common complaint, reported by 51.7% of participants, followed by irregular cycles in 23.3%, intermenstrual bleeding in 11.7%, continuous per vaginal bleeding in 8.3%, and postcoital bleeding in 5.0% of women. Table II shows the distribution of endometrial thickness (ET) as measured on transvaginal ultrasonography. The mean ET across the cohort was 9.8 ± 3.8 mm. The majority of women (26.7%) had ET between 9-11 mm with a mean of 10.2 ± 0.6 mm, followed by 23.3% with ET between 5-8 mm (mean 6.6 ± 0.9 mm), and 20.0% in the 12-14 mm range (mean 12.8 ± 0.7 mm). ET ≥15 mm was seen in 15.0% (mean 16.2 ± 1.0 mm), and ET <5 mm was also observed in 15.0% of women. Table III presents the histopathological findings from endometrial sampling. Proliferative endometrium was the most frequent diagnosis, seen in 33.3% of cases, followed by endometrial hyperplasia without atypia in 21.7%, secretory endometrium in 15.0%, endometrial polyps in 11.7%, hyperplasia with atypia in 10.0%, and endometrial carcinoma in 8.3% of women. Table IV compares mean ET across different histopathological categories. Women with endometrial carcinoma exhibited the highest mean ET of 15.2 ± 3.0 mm, followed by hyperplasia with atypia at 13.2 ± 2.7 mm, hyperplasia without atypia at 10.8 ± 2.5 mm, endometrial polyps at 9.5 ± 2.3 mm, secretory endometrium at 8.1 ± 1.8 mm, and proliferative endometrium at 7.6 ± 2.1 mm. Table V demonstrates the association between ET groups and histopathological outcomes. All women with ET <5 mm had benign findings. In the 5-8 mm group, 92.9% had benign pathology and 7.1% had hyperplasia without atypia. For ET 9-11 mm, benign findings accounted for 62.5%, while 31.2% had hyperplasia without atypia and 6.3% had hyperplasia with atypia. Among women with ET 12-14 mm, 25.0% had benign histology, while 41.7% had hyperplasia without atypia, 16.7% had hyperplasia with atypia, and 16.7% were diagnosed with carcinoma.

In the ≥15 mm group, 33.3% each had hyperplasia with atypia and carcinoma, 22.2% had hyperplasia without atypia, and only 11.1% had benign pathology. Overall, out of 120 women, benign findings were seen in 60.0%, hyperplasia without atypia in 21.7%, hyperplasia with atypia in 10.0%, and carcinoma in 8.3% of cases.

Table-I. *Demographic characteristics of the study people (N=120)*

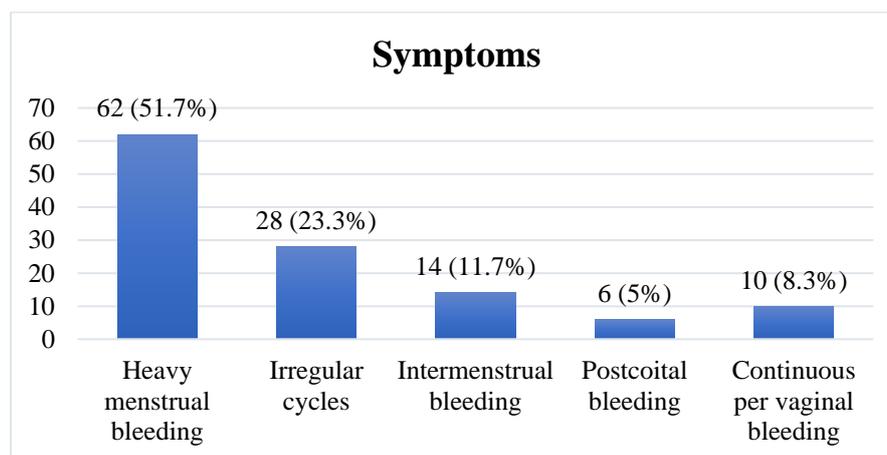| Characteristics	Number of patients	Percentage (%)
Age Group (years)		
40-44	28	23.3
45-49	52	43.3
50-54	30	25.0
≥55	4	8.3
BMI (kg/m²)		
<18.5 (Underweight)	4	3.3
18.5-24.9 (Normal)	40	33.3
25-29.9 (Overweight)	46	38.3
≥30 (Obese)	30	25.0
Parity		
Nulliparous	12	10.0
Para 1-2	40	33.3
Para 3-4	50	41.7
Para ≥5	18	15.0

Symptoms

Figure 1. *Distribution of symptoms among the study people (N=120)*

Table-II. *Distribution of endometrial thickness among the study people (N=120)*

ET Range (mm)	Number of patients (%)	Mean ET (mm)
<5	18 (15.0%)	4.2 ± 0.5
5-8	28 (23.3%)	6.6 ± 0.9
9-11	32 (26.7%)	10.2 ± 0.6
12-14	24 (20.0%)	12.8 ± 0.7
≥15	18 (15.0%)	16.2 ± 1.0

Table-III. *Histopathological findings of the study people (N=120)*

Histopathology Diagnosis	Number of patients	Percentage (%)
Proliferative endometrium	40	33.3
Secretory endometrium	18	15.0
Endometrial hyperplasia (without atypia)	26	21.7
Endometrial hyperplasia (with atypia)	12	10.0
Endometrial polyp	14	11.7
Endometrial carcinoma	10	8.3

Table-IV. *Comparison of mean Endometrial Thickness (ET) among histopathological groups (N=120)*

Histopathological findings	Mean ET (mm) ± SD
Proliferative endometrium	7.6 ± 2.1
Secretory endometrium	8.1 ± 1.8
Endometrial hyperplasia (without atypia)	10.8 ± 2.5
Endometrial hyperplasia (with atypia)	13.2 ± 2.7
Endometrial polyp	9.5 ± 2.3
Endometrial carcinoma	15.2 ± 3.0

Table-V. *Association between Endometrial Thickness (ET) and Histopathological Findings (N=120)*

ET Group (mm)	Benign Findings (n, %)	Hyperplasia without atypia (n, %)	Hyperplasia with atypia (n, %)	Carcinoma (n, %)
<5	18 (100%)	0	0	0
5-8	26 (92.9%)	2 (7.1%)	0	0
9-11	20 (62.5%)	10 (31.2%)	2 (6.3%)	0
12-14	6 (25.0%)	10 (41.7%)	4 (16.7%)	4 (16.7%)
≥15	2 (11.1%)	4 (22.2%)	6 (33.3%)	6 (33.3%)
Total	**72 (60.0%)**	**26 (21.7%)**	**12 (10.0%)**	**10 (8.3%)**

Table-VI. *ROC curve analysis of ET for predicting significant pathology*

ET Cut-off (mm)	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)	AUC (95% CI)
≥11	85	72.5	42.5	95	0.81 (0.74-0.88)
≥12	80	78.3	46.7	93.9	-
≥13	75	83.3	51.7	92.5	-
≥14	70	86.7	56	91.2	-
≥15	65	90	61.1	89.1	-

5. DISCUSSION

Abnormal uterine bleeding (AUB) remains a major clinical concern in perimenopausal women, necessitating evaluation to rule out pre-malignant and malignant pathologies. In this study, the majority of participants were aged 45-49 years (43.3%), consistent with prior reports identifying this age group as the peak period for perimenopausal hormonal fluctuations and AUB.[3,16] The high proportion of overweight (38.3%) and obese (25.0%) women aligns with evidence highlighting obesity as a known risk factor for endometrial hyperplasia and carcinoma due to peripheral conversion of androgens to estrogens in adipose tissue, resulting in prolonged unopposed estrogenic stimulation.[17] Heavy menstrual bleeding (51.7%) was the most common symptom, comparable to findings by Kumari et al.[1] reporting 48% prevalence, and Pillai[18] identifying menorrhagia as the leading presentation in perimenopausal AUB. The mean endometrial thickness (ET) in the current cohort was 9.8 ± 3.8 mm, with the majority of women (26.7%) having ET between 9-11 mm. Similar mean ET values of ~10 mm have been reported by Pillai[18] and Kumari et al.[10], indicating that ET in perimenopausal AUB often falls within an intermediate range, complicating the differentiation between benign and significant pathologies. ET ≥15 mm was seen in 15% of women, which is clinically important considering that previous studies have associated ET >12 mm with higher likelihood of endometrial hyperplasia or malignancy.[19] Histopathological analysis revealed proliferative endometrium as the most common finding (33.3%), followed by endometrial hyperplasia without atypia (21.7%), secretory endometrium (15.0%), hyperplasia with atypia (10.0%), endometrial polyp (11.7%), and carcinoma (8.3%). These results are comparable to those by Kumari et al.[10], who reported proliferative endometrium in 31%, hyperplasia without atypia in 22%, hyperplasia with atypia in 10%, and carcinoma in 7% of cases. Similarly, Wang et al.[9] observed proliferative endometrium as the predominant pathology, with hyperplasia and carcinoma frequencies matching the present study.

These findings underline the need for vigilant screening as nearly one in five perimenopausal women with AUB may harbour pre-malignant or malignant lesions. Mean ET was highest in endometrial carcinoma (15.2 ± 3.0 mm), followed by hyperplasia with atypia (13.2 ± 2.7 mm), hyperplasia without atypia (10.8 ± 2.5 mm), endometrial polyps (9.5 ± 2.3 mm),

secretory endometrium (8.1 ± 1.8 mm), and proliferative endometrium (7.6 ± 2.1 mm). This pattern is consistent with previous studies by Pillai[18], Kumari et al.[10], and Thoprasert et al.[11], who reported mean ET for carcinoma ranging from 14.8-16 mm and hyperplasia with atypia around 12.7-13 mm. Such incremental rise in mean ET with pathology severity reinforces its utility as a screening tool while emphasising that overlaps with benign conditions persist. Analysis of ET cut-off diagnostic performance showed that ≥11 mm had the highest sensitivity (85.0%) and acceptable specificity (72.5%), with an AUC of 0.81, indicating good diagnostic accuracy. Similar results were observed by Kumari et al.[10] who reported sensitivity of 88.9% and specificity of 67.9% at >11 mm, and by Giannella et al.[19] who found sensitivity 83.3%, specificity 78.6%, and AUC 0.82 at the same cut-off. Thoprasert et al.[11] reported slightly lower sensitivity (78.6%) but higher specificity (81.2%) at ≥12 mm, with an AUC of 0.84, while Zhang et al.[20] found sensitivity 89.2% and specificity 77.4% at ≥11 mm in postmenopausal women, suggesting cross-population consistency in ET cut-off predictive values. Interestingly, increasing ET cut-offs in the current study improved specificity and PPV but at the cost of sensitivity. For example, ≥15 mm yielded the highest specificity (90.0%) and PPV (61.1%) but the lowest sensitivity (65.0%). This trend has been previously reported by Pillai[18] and Thoprasert et al.[11], reflecting the diagnostic trade-off clinicians must consider when choosing ET thresholds to guide endometrial sampling decisions. Overall, these findings suggest that while TVS-measured ET is a useful initial triaging tool, reliance solely on ET may miss significant pathology in women with lower measurements.

6. LIMITATIONS OF THE STUDY

In our study, there was small sample size and absence of control for comparison. Study population was selected from one center in Dhaka city, so may not represent wider population. The study was conducted at a short period of time.

7. CONCLUSION AND RECOMMENDATIONS

In conclusion, transvaginal ultrasonographic measurement of endometrial thickness serves as a valuable initial screening tool in perimenopausal women with abnormal uterine bleeding. An ET cut-off of ≥11 mm demonstrated optimal sensitivity and specificity for predicting significant pathology. However, due to overlaps between benign and malignant conditions,

histopathological evaluation remains indispensable for definitive diagnosis and management planning to ensure early detection of pre-malignant and malignant lesions in this high-risk population.

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