



A cross-sectional study of endometrial thickness in perimenopausal women with abnormal uterine bleeding by transvaginal sonography and relation with histopathology

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Abstract

Background: Perimenopause, marked by hormonal fluctuations, often presents with abnormal uterine bleeding (AUB), impacting women's quality of life. Transvaginal sonography (TVS) offers a non-invasive method to assess endometrial thickness, while histopathology remains the gold standard for diagnosis. Correlating TVS findings with histopathology aids in early detection and targeted management of endometrial pathology.

Aim: To evaluate the correlation between endometrial thickness by TVS and histopathology in perimenopausal women with AUB.

Methods: This cross-sectional observational study was conducted at SMS Medical College, Jaipur, involving 40 perimenopausal women (40–55 years) with AUB. Endometrial thickness was measured using transvaginal ultrasonography and correlated with histopathological findings. Data were analyzed using appropriate statistical tests, with $p < 0.05$ considered significant. Ethical approval and informed consent were obtained prior to study initiation.

Results: In this study of 40 perimenopausal women with AUB, mean age was 48.9 years and mean ET 10.25 mm. TVS (AUC = 0.924, cutoff 7.7 mm) showed 96.6% sensitivity and 75% specificity, outperforming HPE (AUC = 0.786). Irregular and heavy bleeding were most common.

Conclusion: This cross-sectional study found a strong correlation between TVS-measured endometrial thickness and histopathology in perimenopausal AUB. TVS is a sensitive, non-invasive screening tool, but histopathology remains the gold standard. Endometrial thickness >7.7 mm warrants biopsy to detect hyperplasia or malignancy, aiding early diagnosis and reducing healthcare burden.

Results: Abnormal Uterine Bleeding, Perimenopausal Women, Endometrial Thickness, Cross-Sectional Study, Hormonal Fluctuations, Transvaginal Sonography.

Introduction

Menstruation results from a complex series of events involving the cerebral cortex, hypothalamus, pituitary, ovary, and uterus, known as the hypothalamic-pituitary-ovarian-uterine (HPOU) axis. Disruption in this axis causes menstrual problems. Perimenopause, the 3–4 years before menopause, involves hormonal decline leading to mood changes, hot flashes, weakness, and menstrual irregularities.¹ It is a transitional phase ending with 12 consecutive months of amenorrhea, marking menopause, typically starting around age 45 but sometimes as early as mid-30s.²

Abnormal uterine bleeding (AUB) refers to any deviation in menstrual frequency, duration, or intensity, affecting 14–25% of reproductive-age women.³ AUB and its subset, heavy menstrual bleeding (HMB), significantly impair quality of life and contribute to anemia, especially in developing countries. The FIGO

Menstrual Disorder Working Group developed the PALM-COEIN classification to identify structural (Polyps, Adenomyosis, Leiomyomas, Malignancy, Hyperplasia) and non-structural causes (Coagulopathy, Ovulatory dysfunction, Endometrial, Iatrogenic, Not yet specified) of AUB.⁴

Endometrial thickness varies throughout the cycle, influenced by estrogen, and is measured by transvaginal sonography (TVS), which offers high-resolution images and helps rule out malignancy when thickness is ≤ 4 –5 mm in postmenopausal bleeding.⁵ Endometrial biopsy remains essential for diagnosis, especially to detect endometrial cancer (EC), the most common gynecologic malignancy worldwide. Studies show strong correlation between TVS measurements and histopathology.⁶

Management of AUB depends on cause, ranging from medical treatments (tranexamic acid, NSAIDs, hormonal therapy) to surgical options (D&C, ablation, hysterectomy) in severe cases.⁷ This study will assess perimenopausal women with AUB via TVS and correlate findings with histopathology.

This study Aim to evaluate the correlation between endometrial thickness measured by Transvaginal Ultrasonography (TVS) and histopathological findings in perimenopausal women with abnormal uterine bleeding (AUB).

Material and Methods

Study Type & Design: Observational, cross-sectional study.

Place & Duration: Department of Obstetrics and Gynaecology, SMS Medical College & attached hospitals, Jaipur; October 2023 until sample size achieved, plus 2 months for analysis.

Population: Perimenopausal women (40–55 years) with abnormal uterine bleeding (AUB) attending Gynaecology OPD.

Sample Size: 40 women, calculated based on ROC curve data for TVS-measured endometrial thickness (AUC 0.920, 80% power, 5% alpha error).

Inclusion Criteria: Women aged 40–55 with AUB, consented, and not in another study.

Exclusion Criteria: Active pelvic infection, structural uterine pathology, hormonal therapy, coagulation/endocrine disorders, vaginal/cervical pathologies, pregnancy complications.

Ethical Clearance: Obtained from Institutional Review Board.

Data Collection

1. Detailed history (menstrual, contraceptive, obstetric, medical, surgical).
 2. General, systemic, and gynecological examination.
- Investigations: CBC, blood group, random blood sugar, renal/liver function tests, coagulation profile, urine routine/microscopy, pregnancy test.

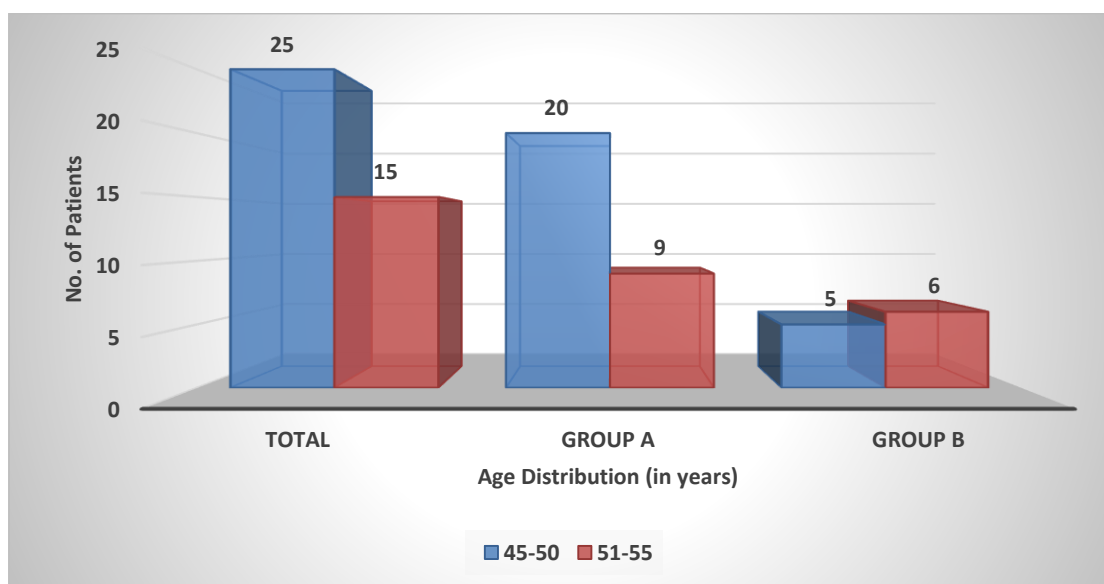
TVS Assessment: 7.5 MHz probe (Sonoace X7) to measure endometrial thickness (longitudinal plane, basal-to-basal), assess uterus, adnexa; condom-covered probe used.

Endometrial Sampling: After bladder emptying and IM sedation, cervix was stabilized with vulsellum, uterus sounded, tissue aspirated via No. 4 Karman's cannula, preserved in 10% formalin for histopathology.

Results and Observations

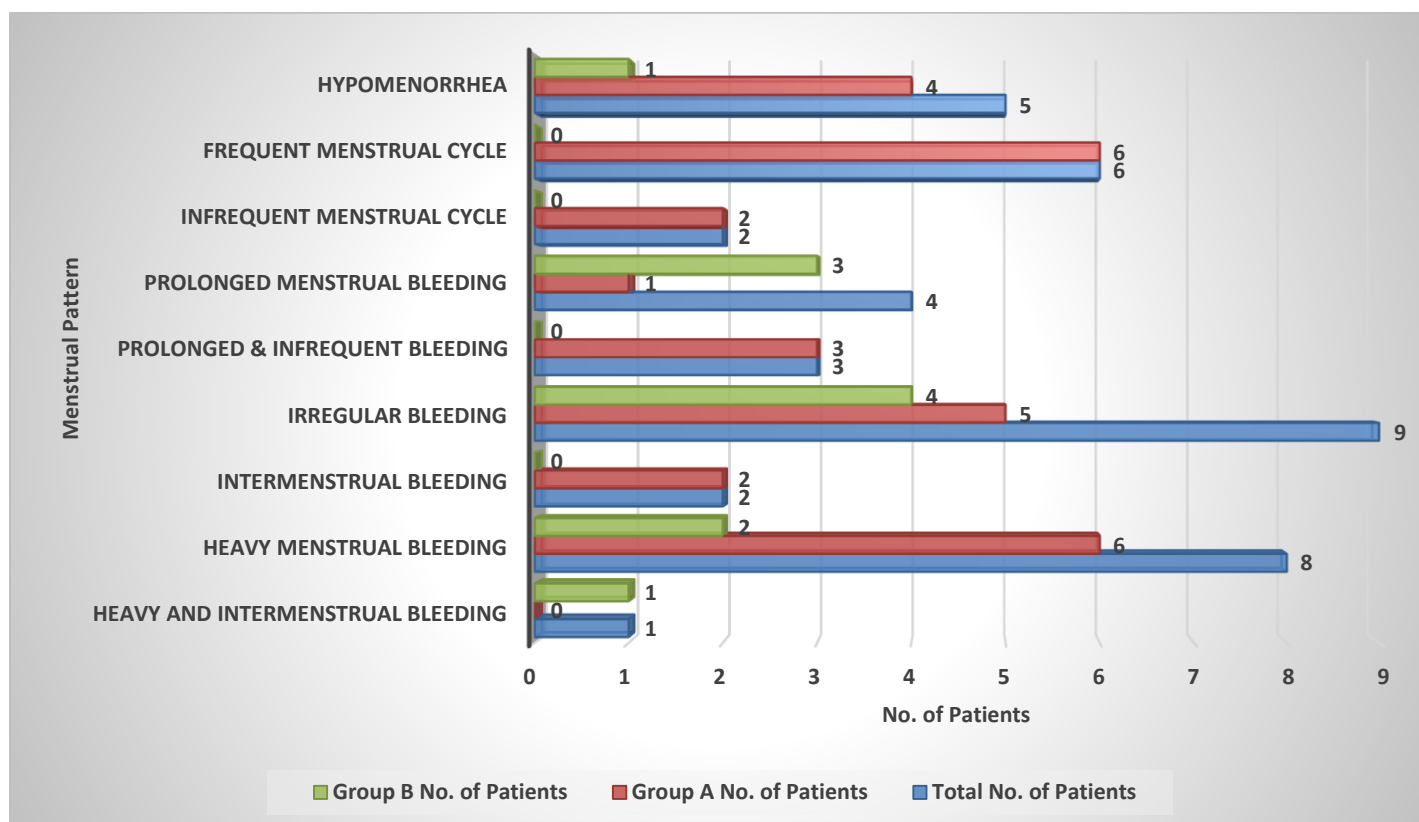
In the study, housewives formed 45% (66.67% Group A), labourers 32.5% (76.92% Group A), farmers 17.5% (71.43% Group A), and teachers 5% (all Group A) ($p = 0.97$). Multiparous women were 62.5%, primiparous 20%, nulliparous 17.5% ($p = 0.07$). Overweight (40%) and obese (37.5%) predominated (mean BMI 28.26 ± 3.58 , $p = 0.93$). Mean marital duration was 25.72 ± 5.86 years ($p = 0.4$). Enlarged uterus occurred in 52.5% ($p = 0.64$). Mean hemoglobin was 10.72 ± 1.63 g/dL ($p = 0.15$). Common TVS findings included cystic changes, increased thickness, and irregular endometrium (each 20%, $p = 0.58$). Homogeneous ECHO pattern predominated (37.5%, $p = 0.39$).

Figure 1: Age Distribution of Study Participants Between Group A and Group B



The study included participants aged 45–55 years, with 62.5% in the 45–50 years' group and 37.5% in the 51–55 years' group. Group A had 80% aged 45–50 years, while Group B had 40% in the 51–55 years range. The mean age overall was 48.9 ± 2.94 years, with Group A at 49.20 ± 2.38 years and Group B at 50.09 ± 3.14 years. The age distribution difference between groups was not statistically significant ($P = 0.34$).

Figure 2: Distribution of Menstrual Patterns Among Study Participants in Group A and Group B.



Among 40 participants, common menstrual abnormalities were irregular bleeding (22.5%), heavy menstrual bleeding (20%), and hypomenorrhea (12.5%). Group A showed higher rates of irregular bleeding (55.56%), heavy bleeding (75%), and hypomenorrhea (80%), with patterns like intermenstrual, prolonged & infrequent cycles seen only in this group. Group B had more prolonged bleeding (75%) and heavy with intermenstrual bleeding (100%). Intermenstrual and cycle irregularities were absent in Group B. The difference between groups was statistically significant ($p = 0.04$), indicating a possible association.

Table 1: Comparison of Endometrial Thickness Between Group A and Group B

Endometrial thickness (mm)	Total		Group A		Group B	
	No. of Patients	Percentage	No. of Patients	Percentage	No. of Patients	Percentage
<5	4	10	4	100.00	0	0.00
5-7	4	10	4	100.00	0	0.00
8-11	18	45	11	61.11	7	38.89
>11	14	35	10	71.43	4	28.57

Total	40	100	29	72.50	11	27.50
Mean±SD	10.25±3.31		9.66±3.12		11.8±3.44	
P-Value	0.02					

Among 40 patients, 45% had endometrial thickness 8–11 mm, 35% >11 mm, and 10% each <5 mm or 5–7 mm. All cases <8 mm occurred in Group A, which also had 61.11% in the 8–11 mm range. Group B had a higher mean thickness (11.8 ± 3.44 mm) than Group A (9.66 ± 3.12 mm). The overall mean was 10.25 ± 3.31 mm, with the difference between groups statistically significant (p = 0.02).

Table 2: Histopathological Findings Among Study Participants in Group A and Group B.

Histo Findings	0-5mm		6-10mm		11-15mm		16-20mm		Total
	No. of Patients	Percentage	No. of Patients	Percentage	No. of Patients	Percentage	No. of Patients	Percentage	No. of Patients
Atrophic endometrium	5	71.43	1	14.29	1	14.29	0	0.0	7
Proliferative phase	0	0.00	8	80.00	2	20.00	0	0.0	10
Secretory endometrium	0	0.00	5	38.46	7	53.85	1	7.7	13
Simple hyperplasia	0	0.00	1	33.33	2	66.67	0	0.0	3
Complex hyperplasia	0	0.00	0	0.00	1	50.00	1	50.0	2
Endometrioid adenocarcinoma	0	0.00	2	40.00	2	40.00	1	20.0	5
Total	5	12.50	17	42.50	15	37.50	3	7.5	40

Histopathological findings showed most cases in the 6–10 score range (42.5%), followed by 11–15 (37.5%), 0–5 (12.5%), and 16–20 (7.5%). Atrophic endometrium was mainly in 0–5 (71.43%), proliferative in 6–10 (80%), secretory in 11–15 (53.85%), and simple hyperplasia in 11–15 (66.67%). Complex hyperplasia was equally in 11–15 and 16–20, while endometrioid adenocarcinoma was equally in 6–10 and 11–15, with fewer in 16–20.

Table 3: ROC Analysis of TVS and Histopathological Findings for Diagnostic Accuracy.

ROC Analysis	Area under Curve	P-Value	95ci	Cutoff Value	Sensitivity	Specificity
TVS Findings	0.924	<0.0001	0.82-1.028	7.7	96.6	75
HPE Findings	0.786	0.004	0.624-0.91	8.5	93.8	58.7

ROC analysis showed TVS had an AUC of 0.924 (p<0.0001) with a 7.7 mm cutoff, yielding 96.6% sensitivity and 75% specificity. HPE had an AUC of 0.786 (p=0.004) with an 8.5 mm cutoff, achieving 93.8% sensitivity and 58.7% specificity, indicating TVS provided higher diagnostic accuracy for detecting endometrial pathology.

Discussion

Abnormal uterine bleeding (AUB) affects 10–15% of reproductive-age and 50% of peri-menopausal women. This cross-sectional study at SMS Medical College, Jaipur, assesses endometrial thickness via TVS in 40 perimenopausal AUB patients, correlating with histopathology, emphasizing early detection and reduced need for invasive D&C.⁸

The study included women aged 45–55 years, mostly 45–50 years (62.5%). Mean age was 48.9 ± 2.94 years, with no significant group difference ($P = 0.34$). Shobhitha G L et al⁹ found AUB most common at 41–50 years, aligning with our results, while Kumari P et al¹⁰ reported mean ages of 44.25 (Group I) and 47.16 years (Group II), with a statistically significant difference ($P = 0.000$).

In this study, most participants were multiparous (62.5%), with Group A showing 84% multiparity and Group B 57.14% nulliparity ($P = 0.07$). Shobhitha G L et al⁹ reported 83.6% multiparous, 10.6% primiparous, and 5.5% nulliparous women. Kumari P et al¹⁰ found mean parity of 2.89 (Group I) and 2.75 (Group II), showing no significant difference.

In this cohort, mean endometrial thickness was higher in Group B (11.8 ± 3.44 mm) than Group A (9.66 ± 3.12 mm) ($P = 0.02$). Shobhitha G L et al⁹ found 45.5% had 8–15 mm thickness, 34.5% had 4–8 mm. Bharatnurs et al¹¹ reported 91.32% between 12–22.9 mm, supporting predominance of moderate thickening.

In this study, cystic changes, irregular endometrium, and increased thickness were common TVS findings. Group A mostly showed irregularity and cystic changes (75%), while Group B had more even distribution. Differences were not significant ($P = 0.58$). Hassan A A R et al¹² found normal endometrium in 20% and thickening >8

mm in 30%. Kumari P et al¹⁰ reported polyps in 8.57% and adenomyosis in 20%.

ROC analysis showed TVS had an AUC of 0.924 ($p < 0.0001$) with 96.6% sensitivity and 75% specificity at a 7.7 mm cutoff. Kumari P et al¹⁰ reported similar accuracy (AUC 0.920, PPV 70.68%, NPV 95.68%, LR+ 6.52, LR– 0.12). Gadge A et al¹³ found 82.05% sensitivity, 72.73% specificity, PPV 91.43%, NPV 53.33%, and 80% accuracy, indicating strong TVS value in detecting endometrial pathology with optimal thresholds.

Conclusion

This cross-sectional study found a significant correlation between endometrial thickness on transvaginal ultrasonography (TVS) and histopathology in perimenopausal women with abnormal uterine bleeding (AUB). Most were aged 45–50 years, with thickness >7.7 mm often indicating pathology. TVS, being simple, non-invasive and economical, showed high sensitivity but limited specificity, making histopathology the gold standard. Invasive procedures are recommended for thickness >7.7 mm or inconclusive TVS. Integrating TVS with clinical and histopathological findings enables early detection of endometrial hyperplasia/malignancy, guiding timely intervention and reducing healthcare burden.

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