OPEN ACCESS

ORIGINAL ARTICLE *Volume 14 (Issue 4), 2025*

PAKISTAN JOURNAL OF MEDICINE & DENTISTRY

Sonographic and Histopathological Correlation and Evaluation of Endometrium in Perimenopausal Women with Abnormal Uterine Bleeding

Ekta Raj[1], Muhammad Imran Ibrahim[2], Sajad Ahmed[1], Subash Khataumal[3], Shahnila[1], Sanaullah Soomro[2]

[1]Department of Diagnostic Radiology, Indus Medical College, Tando Mohammad Khan, Hyderabad, [2]Department of Diagnostic Radiology, Combined Military Hospital (CMH), Tarbela, [3]Department of Radiology, Murshid Hospital, Karachi, Pakistan

ABSTRACT

Background: Abnormal uterine bleeding (AUB) is one of the most frequent gynecological complaints among perimenopausal women and can be caused by a wide range of structural and functional abnormalities. The study aimed to investigate the types of menstrual abnormalities in perimenopausal women and to correlate transvaginal ultrasonography (TVUS) findings—specifically endometrial thickness and pattern—with histopathological examination (HPE) of the endometrium.

Methods: This cross-sectional study, conducted at the Gynecology and Radiology Department of Indus Medical College, Tando Mohammad Khan, from January 2023 to December 2024, included 70 perimenopausal women (aged 20–40) with abnormal uterine bleeding (AUB). All patients underwent medical testing and preoperative assessments, with endometrial thickness measured via transvaginal ultrasound (TVUS) using a 7.5 MHz vaginal probe, recording the maximum double-layer thickness in the mid-sagittal plane near the fundus. Data were analyzed in SPSS v27 using descriptive statistics and chi-square tests, with $p < 0.05$ considered significant.

Results: The most common histopathological findings were fibroids (32.9%), adenomyosis (20.0%), dysfunctional uterine bleeding (35.7%), and polyps (11.4%). Disordered proliferation was particularly observed in cases of menorrhagia (36.4%) and menometrorrhagia (31.8%). Secretory changes were predominant in metropathia (75.0%), while postcoital bleeding was frequently associated with carcinoma (33.3%). Mean endometrial thickness was highest in menorrhagia (10.32 ± 1.15 mm) and lowest in polymenorrhea cases (9.58 ± 1.35 mm).

Conclusion: In perimenopausal women with AUB, TVUS is the preferred investigation due to its convenience, accuracy, and non-invasiveness. If hyperplastic endometrium or endometrial thickness >8 mm is found, endometrial histopathology is needed to exclude atypia or malignancy.

Keywords: Endometrial thickness, Perimenopausal women, Abnormal uterine bleeding, Histopathological correlation.

***Corresponding Author:** Ekta Raj

Email:rajekta00@gmail.com

How to cite: Raj E, Ibrahim MI, Ahmed S, Khataumal S, Shahnila, Soomro S. Sonographic and Histopathological Correlation and Evaluation of Endometrium in Perimenopausal Women with Abnormal

Uterine Bleeding. Pak J Med Dent. 2025 September ;14(4): A-B. Doi: https://doi.org/10.36283/ziun-pjmd14-4/070

Received: : Wed, Aug 06, 2025 **Accepted**: Tue, September 09, 2025 **Published:** Mon, September 29, 2025.

INTRODUCTION

The clinical issue of abnormal uterine bleeding (AUB) occurs frequently and severely affects perimenopausal women. The ageing process leading to menopause between 45 and 55 years causes hormonal changes to result in abnormal and irregular menstruation[1]. AUB refers to any variation from the usual menstrual cycle patterns leading to heavy bleeding, prolonged bleeding, or irregular bleeding intervals[2]. Previous research indicates that abnormal uterine bleeding affects half of perimenopausal women specifically[3]. International statistics on AUB occurrence in perimenopausal women vary, but medical professionals recognize this issue as a common clinical concern that remains challenging to diagnose and treat[4].

AUB develops due to multiple factors in perimenopausal patients because structural and functional problems combine to create bleeding symptoms[5]. Abnormal bleeding patterns frequently occur as a result of endometrial hyperplasia as well as fibroids, polyps, and endometrial carcinoma conditions[6]. The changing structure of the endometrium because of hormonal changes requires healthcare providers to separate normal from suspicious causes of AUB precisely. A correct diagnosis must be established by utilizing various diagnostic tools because they enable the effective management of these patients[7].

The assessment of the endometrium in women with AUB primarily depends on sonographic evaluation to diagnose the condition. The transvaginal ultrasound device delivers important endometrial information regarding the lining thickness, diagnoses fibroids and polyps, and spots other abnormalities[8]. Histopathological examination, together with ultrasound findings, creates a complete picture for determining benign and malignant causes of bleeding through endometrial examination[9,10].

Literature evaluates the relation between ultrasound results and tissue examination findings to study endometrial assessments performed on perimenopausal women diagnosed with AUB. This study evaluates the ability of ultrasound to identify endometrial conditions and links its results with pathologic outcomes to create better solutions for treating abnormal uterine bleeding among perimenopausal women. New management strategies developed from this approach would result in increased precision and effectiveness of treatment while decreasing the need for improper medical interventions.

METHODS

This cross-sectional study was conducted in the Gynaecology and Radiology department of Indus Medical College, Tando Mohammad Khan, from January 2023 to December 2024. Ethical approval was obtained from the institutional ethics review committee of SIMS, Lahore, under reference number (# SIMS/AL/2023-064). The research included 70 women between 20 and 40 years old in their perimenopausal stage that experienced abnormal uterine bleeding (AUB). The research included 70 women between 20 and 40 years old in their perimenopausal stage that experienced abnormal uterine bleeding (AUB). Women with a history of hormonal therapy within the last 3 months, known endometrial malignancy, pelvic inflammatory disease, pregnancy, uterine malformations, or bleeding disorders were excluded from the study.

Detailed patient history was taken about menstrual issues, duration of complaints, previous surgeries and treatment. The clinical evaluation for all women included general physical tests along with systemic tests and gynaecological tests. Sample size was calculated by using Openepi.com software, 95% CI, 80% power of study and proportion of 46.6%[11] endometrial thickness 5-9.9 mm.

Every patient underwent appropriate medical testing as well as preoperative assessments. The ultrasonography was operated with a 7.5 MHz vaginal probe to perform TVUS. Gynecologist measured endometrial thickness by determining the maximum double-layer layers detected in the mid-sagittal section near the fundus where the endometrium reached its thickest dimensions. They included the endometrial borders from both sides. Experienced sonologist who worked at the medical college performed all scans. Endometrial dilatation followed by curettage (D&C) occurred as inpatient procedures within 24 to 48 hours of the TVUS examination, while health professionals conducted a histopathological examination (HPE) of the endometrium. A comparison was established regarding menstrual abnormalities between endometrial TVUS thickness results and histopathological findings for analysis.

Data were analyzed using SPSS version 27. Descriptive statistics were expressed as mean and standard deviation (SD), while the chi-square test was applied to assess associations between categorical variables. A p-value less than 0.05 was considered statistically significant.

Women with a history of hormonal therapy within the last 3 months, known endometrial malignancy, pelvic inflammatory disease, pregnancy, uterine malformations, or bleeding disorders were excluded from the study.

Detailed patient history was taken about menstrual issues, duration of complaints, previous surgeries and treatment. The clinical evaluation for all women included general physical tests along with systemic tests and gynaecological tests. Sample size was calculated by using Openepi.com software, 95% CI, 80% power of study and proportion of 46.6%[11] endometrial thickness 5-9.9 mm.

Every patient underwent appropriate medical testing as well as preoperative assessments. The ultrasonography was operated with a 7.5 MHz vaginal probe to perform TVUS. Gynecologist measured endometrial thickness by determining the maximum double-layer layers detected in the mid-sagittal section near the fundus where the endometrium reached its thickest dimensions. They included the endometrial borders from both sides. Experienced sonologist who worked at the medical college performed all scans. Endometrial dilatation followed by curettage (D&C) occurred as inpatient procedures within 24 to 48 hours of the TVUS examination, while health professionals conducted a histopathological examination (HPE) of the endometrium. A comparison was established regarding menstrual abnormalities between endometrial TVUS thickness results and histopathological findings for analysis.

Data were analyzed using SPSS version 27. Descriptive statistics were expressed as mean and standard deviation (SD), while the chi-square test was applied to assess associations between categorical variables. A p-value less than 0.05 was considered statistically significant.

RESULTS

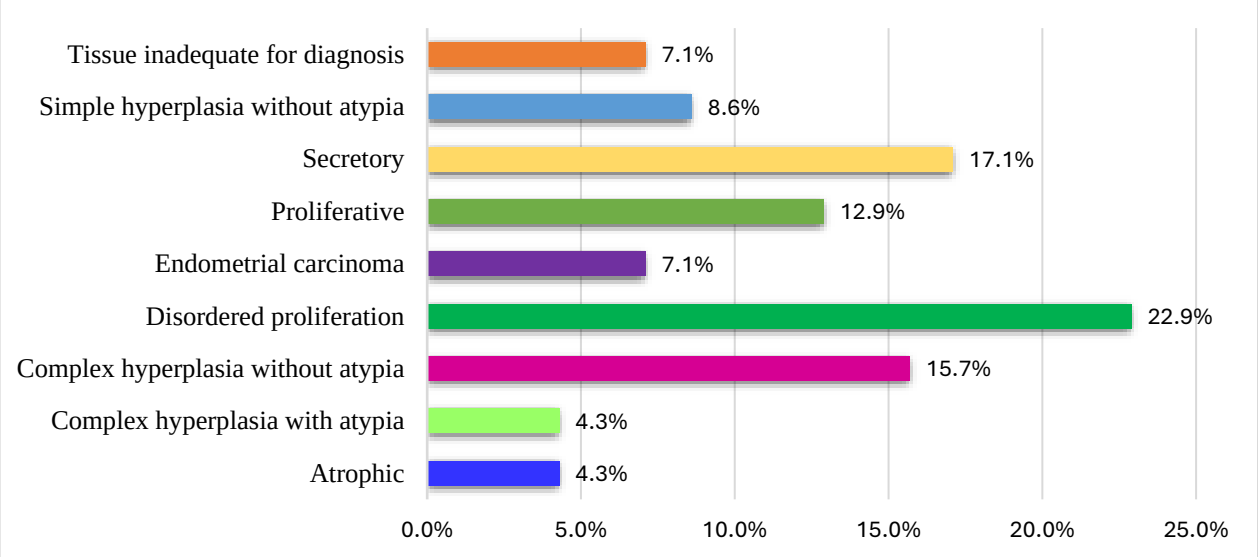
Table 1: Demographics and Baseline Profile of The Patients

Variables	Presence N (%), Mean±SD
Age (years)	29.17±4.96
Parity	
0	8 (11.4)
≤2	45 (64.3)
>2	17 (24.3)
Menstrual complaints	
Menorrhagia	22 (31.4)
Menometrorrhagia	22 (31.4)
Metriopatheia	8 (11.4)

Polymorphous	9 (12.9)
Postcoital bleeding	9 (12.9)
Pathology	
Fibroid	23 (32.9)
Adenomyosis	14 (20.0)
DUB	25 (35.7)
Endometrial polyp	8 (11.4)
Endometrial thickness (mm)	10.13±1.29

The average age was 29.17±4.96 years. Regarding parity, 11.4% were nulliparous, 64.3% had ≤2 births, and 24.3% had >2 births. Menstrual complaints were distributed among menorrhagia (31.4%), menometrorrhagia (31.4%), metriopatheia (11.4%), polymorphous bleeding (12.9%), and postcoital bleeding (12.9%). Pathological findings included fibroids (32.9%), adenomyosis (20.0%), dysfunctional uterine bleeding (DUB) (35.7%), and endometrial polyps (11.4%). The average endometrial thickness was 10.13±1.29 mm **(Table 1).**

The histopathological findings among patients showed fibroids in 32.9%, adenomyosis in 20.0%, dysfunctional uterine bleeding (DUB) in 35.7%, and endometrial polyps in 11.4% **Figure 1**.



.Figure 1: Findings of histopathology of the patients

Table 2: Association of Histopathology Findings with Menstrual Complaints

	Menstrual complaints

Findings of histopathology	Menorrhagia	Menometrorrhagia	Metriopatheia	Polymorphous	Postcoital bleeding
Atrophic	1 (4.5)	0 (0.0)	0 (0.0)	0 (0.0)	2 (22.2)
Complex hyperplasia with atypia	0 (0.0)	2 (9.1)	0 (0.0)	0 (0.0)	1 (11.1)
Complex hyperplasia without atypia	5 (22.7)	3 (13.6)	2 (25.0)	0 (0.0)	1 (11.1)
Disordered proliferation	8 (36.4)	7 (31.8)	0 (0.0)	1 (11.1)	0 (0.0)
Endometrial carcinoma	0 (0.0)	2 (9.1)	0 (0.0)	0 (0.0)	3 (33.3)
Proliferative	2 (9.1)	2 (9.1)	0 (0.0)	4 (44.4)	1 (11.1)
Secretory	1 (4.5)	2 (9.1)	6 (75.0)	3 (33.3)	0 (0.0)
Simple hyperplasia without atypia	5 (22.7)	3 (13.6)	2 (25.0)	0 (0.0)	1 (11.1)
Tissue inadequate for diagnosis	2 (9.1)	2 (9.2)	0 (0.0)	0 (0.0)	1 (11.1)
χ^2=67.25, d.f=32, p<0.001					

Disordered proliferation was the most common finding in menorrhagia (36.4%) and menometrorrhagia (31.8%). Simple hyperplasia without atypia and complex hyperplasia without atypia are also prevalent in menorrhagia (22.7% each). Secretory changes are dominant in metriopatheia (75.0%) and notable in polymorphous cases (33.3%). Postcoital bleeding is most frequently associated with endometrial carcinoma (33.3%). Atrophic changes were observed in 4.5% of menorrhagia cases and 22.2% of postcoital bleeding cases. The association was statistically significant (χ^2=67.25, d.f=32, p<0.001) **(Table 2).**

Table 3: Association of Endometrial Thickness and Menstrual Complaints

Endometrial thickness (mm)	Menstrual complaints				
	Menorrhagia	Menometrorrhagia	Metriopatheia	Polymorphous	Postcoital bleeding

Mean±S.D	10.32±1.15	10.06±1.44	10.23±1.48	9.58±1.35	10.22±1.09
F=, 0.54 d.f=69, p=0.707. Pearson correlation=-0.085, p=0.486					

The mean endometrial thickness was highest in menorrhagia (10.32±1.15 mm) and lowest in polymorphous cases (9.58±1.35 mm). Menometrorrhagia (10.06±1.44 mm), metriopatheia (10.23±1.48 mm), and postcoital bleeding (10.22±1.09 mm) showed almost similar mean thickness values. The statistical analysis indicated that there was no significant association between endometrial thickness and menstrual complaints (F=0.54, d.f=69, p=0.707), and Pearson correlation suggested a weak negative relationship. (-0.085, p=0.486) **Table 3.**

DISCUSSION

AUB is the leading cause of gynecologic consultations in perimenopausal women, necessitating thorough evaluation—including sonographic and histological assessment of the endometrium to rule out endometrial cancer or hyperplasia, which is a key diagnostic priority in current practice.

In this study, the mean age of patients was 29.17 ± 4.96 years, which aligns with findings from the study conducted on abnormal uterine bleeding (AUB) in reproductive-aged women, reported slightly older age groups (e.g., 30–40 years) due to higher fibroid prevalence with increasing age[12]. Regarding **parity**, our findings of 11.4% nulliparous, 64.3% ≤2 births, and 24.3% >2 births are consistent with research conducted showing that multiparity is a risk factor for conditions like fibroids and adenomyosis[13].

In this study, menorrhagia was the most common clinical presentation, observed in 31.4% of cases, followed closely by menometrorrhagia at the same percentage (31.4%). These findings are very similar study that studied 219 perimenopausal women in New Delhi[14]. The most frequent histopathological finding observed in the study was proliferative endometrium, which aligns with the results reported in the 2003 study[15]. Additionally, the mean endometrial thickness was measured at 7.45 mm during the proliferative phase and 12.45 mm in the secretory phase, further supporting the consistency with prior research.

However, these findings contrast with a study that identified secretory endometrium as the most common histological pattern, present in 32.4% of cases, followed by proliferative endometrium, indicating potential variability in endometrial patterns across different study populations or methodological approaches[16]. Research found that an endometrial thickness <5 mm on transvaginal ultrasound ruled out malignancy or atypia, eliminating the need for D&C, a conclusion supported by this study, suggesting such cases can avoid invasive procedures safely[17].

A previous study reported that an endometrial thickness of 8 mm or less is less likely to be associated with malignant pathology in perimenopausal women with abnormal uterine bleeding[18]. However, there is no clear definition of what constitutes an abnormal endometrial thickness in menstruating perimenopausal women. The upper limit for normal endometrial thickness remains controversial, though most studies suggest that a transvaginal sonographic measurement exceeding 8 mm should be considered abnormal, warranting further investigation[19].

Patients with a history of irregular menstrual cycles, polycystic ovarian syndrome (PCOS), and anovulatory cycles are at an increased risk for the progression of endometrial hyperplasia, which can further develop into endometrial cancer if left untreated. Specifically, the risk of endometrial cancer is significantly higher in patients with complex atypical hyperplasia, reaching up to 29%[20]. In contrast, those with hyperplasia without atypia have a much lower risk of approximately 2%[20].

Given these substantial risks, it is important to emphasize that all patients diagnosed with endometrial hyperplasia on transvaginal ultrasound (TVUS) must undergo a thorough endometrial evaluation through dilation and curettage (D&C) to confirm the diagnosis, assess the presence of atypia, and guide appropriate management to prevent malignant progression[21,22,23,24].

The findings further highlight the clinical utility of transvaginal ultrasonography as a first-line diagnostic tool in the evaluation of abnormal uterine bleeding among perimenopausal women. TVUS not only provides valuable information about endometrial thickness and pattern but also aids in detecting structural abnormalities such as fibroids, polyps, and adenomyosis. When combined with histopathological confirmation, this dual approach enhances diagnostic accuracy and reduces the risk of missed malignancies[25]. Importantly, incorporating TVUS into routine gynecological practice allows for early identification of high-risk patients, thereby facilitating timely intervention and reducing the burden of invasive diagnostic procedures like dilation and curettage in low-risk cases.

CONCLUSION

In perimenopausal women with AUB, TVUS is the preferred investigation due to its convenience, accuracy, and non-invasiveness. If hyperplastic endometrium or endometrial thickness >8 mm is found, endometrial histopathology is needed to exclude atypia or malignancy.

FUNDING

None

CONFLICT OF INTEREST

None

ETHICAL APPROVAL

Ethical approval was obtained from the institutional ethics review committee of SIMS, Lahore, under reference number (# SIMS/AL/2023-064).

AUTHORS' CONTRIBUTION

All authors contributed equally.

REFERENCES

1. Merchant RA. Health issues in the ageing woman. In: Pathy's Principles and Practice of Geriatric Medicine. 6th ed. Chichester: Wiley-Blackwell; 2022 Mar 28. p. 1433–41. doi:10.1002/9781119484288.ch114.
2. Achanna KS, Nanda J. Evaluation and management of abnormal uterine bleeding. Med J Malaysia. 2022 May 1;77(3):374–83. doi: not available.
3. Wang L, Quan S, Bai E, Yang X. Analysis of clinical data of different endometrial pathological types in perimenopausal women with abnormal uterine bleeding. Front Oncol. 2024 Feb 29;14:1370681. doi:10.3389/fonc.2024.1370681.
4. Hota BM, Bakshi K, Lokam G, Movva N, Mokoagow MI, Budiman D, et al. Clinicopathological analysis of postmenopausal bleeding and endometrium. Folia Med Indonesiana. 2024 Mar;60(1):1–7. doi:10.20473/fmi.v60i1.50539.
5. Ivanović R, Joksimović B, Čančar V, Marić H, Matović D, Lalović N, et al. Factors associated with abnormal uterine bleeding in perimenopausal women. Clin Exp Obstet Gynecol. 2024 Feb 18;51(2):37. doi: not available.
6. Ring KL, Mills AM, Modesitt SC. Endometrial hyperplasia. Obstet Gynecol. 2022 Dec 1;140(6):1061–75. doi:10.1097/AOG.0000000000004989.
7. Modak R, Pal A, Pal A, Bose K. Abnormal uterine bleeding in perimenopausal women: sonographic and histopathological correlation and evaluation of uterine endometrium. Int J Reprod Contracept Obstet Gynecol. 2020 May;9(5):1959–65. doi: not available.
8. Daga S, Phatak S. Sonography evaluation of abnormal uterine bleeding in perimenopausal women with pathological correlation. J Datta Meghe Inst Med Sci Univ. 2019;14(4):288–92. doi:10.4103/jdmimsu.jdmimsu_99_19.
9. Nasri MN, Coast GJ. Correlation of ultrasound findings and endometrial histopathology in postmenopausal women. Br J Obstet Gynaecol. 1989 Nov;96(11):1333–8. doi:10.1111/j.1471-0528.1989.tb03233.x.

10. Thakur P, Sidid S. A prospective comparative study of endometrium by transvaginal sonogram and its correlation with histopathology in peri-menopausal women with abnormal uterine bleeding. Sch Int J Obstet Gynec. 2021;4(5):202–9. doi:10.36348/sijog.2021.v04i05.006.
11. Selvam V, Lakshminarayanan P, Lakshminarayanan Jr P. A comprehensive approach: correlating ultrasound imaging with endometrial histopathological analysis in perimenopausal women with heavy menstrual bleeding. Cureus. 2024 Mar 29;16(3):e57201. doi:10.7759/cureus.57201.
12. Lou Z, Huang Y, Li S, Luo Z, Li C, Chu K, et al. Global, regional, and national time trends in incidence, prevalence, years lived with disability for uterine fibroids, 1990–2019: an age–period–cohort analysis for the Global Burden of Disease 2019 study. BMC Public Health. 2023 May 19;23(1):916. doi:10.1186/s12889-023-15765-x.
13. Dai Y, Chen H, Yu J, Cai J, Lu B, Dai M, et al. Global and regional trends in the incidence and prevalence of uterine fibroids and attributable risk factors at the national level from 2010 to 2019: a worldwide database study. Chin Med J (Engl). 2024 Nov 5;137(21):2583–9. doi:10.1097/CM9.0000000000002971.
14. Bhardwaj TT, Hiwale KM, Vagha S, Tiwari T. Correlation of morphological findings of endometrium with concerned hormone levels in patients with abnormal uterine bleeding: a narrative review. Cureus. 2022 Oct 8;14(10):e30165. doi:10.7759/cureus.30165.
15. Ramchandani L, Jatav J, Jain A, Jain R. Histopathological evaluation of uterine lesions in women with AUB in Vindhya region of Madhya Pradesh. Panacea J Med Sci. 2023 Jan 16;12(3):662–7. doi:10.18231/j.pjms.2022.123.
16. Frias Gomez J. Advancing in endometrial cancer prevention: exploring the role of circadian disruption factors and the sensitivity of cervicovaginal cytology for its detection [master's thesis]. Barcelona: University of Barcelona; 2024.
17. Machado LS, Mathew M, Al-Hassani A, Vaclavinkova V. Correlation of endometrial thickness, cycle day and histopathology in women with abnormal uterine bleeding. Saudi Med J. 2005;26(2):260–3. PMID: 15770302.
18. Thoprasert P, Phaliwong P, Smanchat B, Prommas S, Bhamarapravatana K, Suwannarurk K. Endometrial thickness measurement as predictor of endometrial hyperplasia and cancer in perimenopausal uterine bleeding: cross-sectional study. Asian Pac J Cancer Prev. 2023;24(2):693–700. doi:10.31557/APJCP.2023.24.2.693.
19. Parihar M, Parihar A. Peri- and postmenopausal uterine bleeding—transvaginal ultrasound with hysterosonography and diagnostic correlation with hysteroscopy. Donald Sch J Ultrasound Obstet Gynecol. 2012;5(4):343–52. doi:10.5005/jp-journals-10009-1212.

20. Giannella L, Grelloni C, Bernardi M, Cicoli C, Lavezzo F, Sartini G, et al. Atypical endometrial hyperplasia and concurrent cancer: a comprehensive overview on a challenging clinical condition. Cancers (Basel). 2024 Feb 24;16(5):914. doi:10.3390/cancers16050914.
21. Saccardi C, Spagnol G, Bonaldo G, Marchetti M, Tozzi R, Noventa M. New light on endometrial thickness as a risk factor of cancer: what do clinicians need to know? Cancer Manag Res. 2022 Apr 2;14:1331–40. doi:10.2147/CMAR.S352173.
22. Radwan S, Nemattallah WM, El Serafi AF. Role of transvaginal ultrasonography and color Doppler in the assessment of vaginal bleeding in postmenopausal women. Suez Canal Univ Med J. 2025 Jul 10;28(7):26–34.
23. Daniilidis A, Grigoriadis G, Dalakoura D, D'Alterio MN, Angioni S, Roman H. Transvaginal ultrasound in the diagnosis and assessment of endometriosis—an overview: how, why, and when. Diagnostics (Basel). 2022 Nov 23;12(12):2912. doi:10.3390/diagnostics12122912.
24. Deslandes A, Leonardi M. Proposed simplified protocol for initial assessment of endometriosis with transvaginal ultrasound. Ultrasound Obstet Gynecol. 2024 Sep 13;64(3). doi:10.1002/uog.29115.
25. Bashir N, Nisar U, Jamil M, Wahid S. Diagnostic accuracy of transvaginal ultrasound in detection of endometrial carcinoma in post-menopausal bleeding keeping histopathology as gold standard. Insights-J Health Rehabil. 2025 Jan 20;3(1):138–48