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Original Article

Clinicopathological Correlation in Perimenopausal Women With Abnormal Uterine Bleeding Undergoing Endometrial Sampling

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ABSTRACT

Background: Abnormal uterine bleeding is a common gynecological presentation during perimenopause and may reflect benign hormonal changes, structural uterine lesions, endometrial hyperplasia, or malignancy. Because clinical symptoms and ultrasound findings may overlap across benign and high-risk pathology, histopathological assessment remains important for accurate diagnosis. Objective: To evaluate clinical presentation, transvaginal ultrasound findings, and histopathological patterns among perimenopausal women with abnormal uterine bleeding undergoing endometrial sampling. Methods: This descriptive cross-sectional study included 350 perimenopausal women aged 40–55 years presenting with abnormal uterine bleeding at tertiary-care hospitals in Lahore, Pakistan. Demographic and clinical data were recorded, transvaginal ultrasound was performed to assess endometrial thickness and focal lesions, and endometrial sampling was conducted using Pipelle biopsy or hysteroscopic-guided sampling when indicated. Data were analyzed using descriptive statistics and association testing. Results: The mean age was 47.8 ± 4.2 years and mean body mass index was 28.3 ± 5.1 kg/m². Heavy menstrual bleeding was the most common presentation (55.1%), followed by intermenstrual bleeding (25.1%). Endometrial thickening of ≥5 mm was present in 40.0%, and focal lesions were identified in 25.0%. Benign histopathological findings accounted for 79.7%, hyperplasia without atypia for 6.0%, atypical hyperplasia for 9.1%, and carcinoma for 5.1%. High-risk pathology was present in 14.3%. Conclusion: Most perimenopausal women with abnormal uterine bleeding had benign pathology, but a clinically important minority had atypical hyperplasia or carcinoma. Integrated clinical, ultrasound, and histopathological assessment is essential for timely diagnosis and risk stratification. Keywords: Perimenopause, abnormal uterine bleeding, endometrial biopsy, histopathology, endometrial hyperplasia, endometrial carcinoma, transvaginal ultrasound, risk factors.

INTRODUCTION

Abnormal uterine bleeding is a frequent gynecological presentation during the perimenopausal transition and represents a clinically important diagnostic challenge because the same symptom pattern may arise from benign hormonal variation, structural uterine pathology, premalignant endometrial disease, or endometrial carcinoma. Perimenopause is characterized by progressive ovarian functional decline, irregular ovulatory cycles, and fluctuating estrogen–progesterone exposure, which may alter menstrual frequency, duration, regularity, and volume. Although many cases are benign, abnormal

bleeding in women aged 40–55 years requires careful assessment because the probability of endometrial hyperplasia and malignancy increases with advancing age and metabolic risk factors (1).

The clinical burden of abnormal uterine bleeding extends beyond menstrual irregularity. Heavy, prolonged, or unpredictable bleeding may result in fatigue, anemia, impaired daily functioning, and repeated health-care visits. In perimenopausal women, heavy menstrual bleeding and intermenstrual bleeding are particularly important because they may reflect anovulatory endometrial proliferation, endometrial polyps, submucosal fibroids, hyperplasia, or malignancy. However, symptoms alone have limited discriminatory value, as benign and high-risk endometrial lesions may present with overlapping clinical features. This limitation supports the need for objective assessment using a combined diagnostic approach rather than relying on history and pelvic examination alone (2).

Transvaginal ultrasonography is commonly used as an initial imaging modality because it is non-invasive, accessible, and useful for measuring endometrial thickness and identifying focal abnormalities such as polyps, submucosal fibroids, and intracavitary lesions. Nevertheless, endometrial thickness in perimenopausal women is influenced by menstrual-cycle phase and hormonal variability, which limits the reliability of a single sonographic threshold. A thickened endometrium may increase suspicion for pathology, particularly in the presence of risk factors, but normal or borderline endometrial thickness does not fully exclude focal or early premalignant lesions. Therefore, ultrasound is best interpreted as a risk-stratification and biopsy-guiding tool rather than a substitute for histopathological evaluation (3).

Endometrial sampling remains central to the evaluation of perimenopausal abnormal uterine bleeding because it provides direct tissue diagnosis and allows classification of endometrial patterns into benign, hyperplastic, premalignant, and malignant categories. Pipelle biopsy is widely used because it is minimally invasive and suitable for outpatient assessment, whereas hysteroscopic-guided biopsy or dilation and curettage may be required when sampling is inadequate or when focal lesions are suspected on ultrasound. Histopathological confirmation is particularly important in women with older age, obesity, diabetes mellitus, hypertension, or persistent bleeding, as these factors may increase the likelihood of endometrial hyperplasia or carcinoma (4).

The International Federation of Gynecology and Obstetrics classification has improved the terminology and clinical categorization of abnormal uterine bleeding by distinguishing structural and non-structural causes, but local clinicopathological correlation remains necessary because disease patterns, health-care access, referral pathways, and risk-factor profiles vary across populations (5). In Pakistan, available evidence suggests that most perimenopausal women with abnormal uterine bleeding have benign histopathological findings, yet a clinically meaningful minority may have hyperplasia with atypia or malignancy. Local tertiary-care hospitals receive a heterogeneous patient population, including women with delayed presentation and metabolic comorbidities, making it important to define the relationship between clinical features, ultrasound findings, and histopathological outcomes in this setting (6).

Despite the routine use of clinical examination, transvaginal ultrasound, and endometrial biopsy, uncertainty remains regarding which clinical and sonographic features best identify women at higher risk of premalignant or malignant endometrial pathology. Existing literature supports the role of age, obesity, diabetes, and endometrial thickening as risk indicators, but the relative contribution of these features in local perimenopausal populations is not consistently reported. A clearer clinicopathological correlation may help clinicians prioritize early endometrial sampling, guide hysteroscopic evaluation when focal lesions are suspected, and reduce missed diagnoses of high-risk endometrial disease (7).

This study was therefore designed to evaluate the clinical presentation, transvaginal ultrasound findings, and histopathological patterns among perimenopausal women with abnormal uterine bleeding undergoing endometrial sampling at tertiary-care hospitals in Lahore, Pakistan. The study aimed to estimate the frequency of benign, hyperplastic, premalignant, and malignant endometrial findings and to assess whether age, body mass index, diabetes, and ultrasound abnormalities were associated with

high-risk endometrial pathology. The primary research question was whether clinical risk factors and ultrasound findings can help identify perimenopausal women with abnormal uterine bleeding who are more likely to have premalignant or malignant histopathological changes (8).

MATERIALS AND METHODS

This descriptive cross-sectional study was conducted in tertiary-care gynecology settings in Lahore, Pakistan, from January 2025 to December 2025. The study was designed to examine the clinicopathological correlation between clinical presentation, transvaginal ultrasound findings, and histopathological diagnosis among perimenopausal women presenting with abnormal uterine bleeding. A cross-sectional design was selected because the objective was to estimate the distribution of endometrial histopathological patterns and evaluate their association with clinical and sonographic characteristics at the time of diagnostic assessment rather than to establish causal relationships or longitudinal disease progression.

The study population comprised perimenopausal women aged 40–55 years who presented with abnormal uterine bleeding and underwent endometrial assessment. Perimenopause was operationally defined as the menopausal transition age range accompanied by menstrual irregularity or abnormal bleeding patterns before complete cessation of menstruation. Abnormal uterine bleeding was defined according to recognized clinical criteria as variation in menstrual frequency, regularity, duration, or volume, including heavy menstrual bleeding, prolonged menstrual bleeding, intermenstrual bleeding, or postcoital spotting (9). Women were eligible if they were aged 40–55 years, had abnormal uterine bleeding, and consented to clinical evaluation, transvaginal ultrasound, and endometrial sampling. Pregnant women, women receiving anticoagulant therapy, those with known bleeding disorders, women with previously diagnosed endometrial carcinoma, and women with a history of hysterectomy were excluded to reduce diagnostic heterogeneity and avoid confounding from non-endometrial or previously treated pathology.

Participants were recruited consecutively from eligible women presenting during the study period. After eligibility screening, the study purpose, examination procedures, ultrasound assessment, sampling method, possible discomfort, and follow-up requirements were explained, and informed consent was obtained before enrollment. A structured data collection form was used to record demographic and clinical information, including age, parity, body mass index, diabetes mellitus, hypertension, thyroid disorders, menstrual pattern, bleeding duration, bleeding frequency, heaviness of bleeding, intermenstrual or postcoital bleeding, dysmenorrhea, pelvic discomfort, and fatigue. Body mass index was recorded in kg/m² and categorized for analysis, with obesity defined as BMI ≥30 kg/m². Diabetes, hypertension, and thyroid disorders were recorded based on documented history or current treatment.

All participants underwent general physical, abdominal, speculum, and bimanual pelvic examination. General examination focused on overall clinical status and features suggestive of systemic illness or anemia. Abdominal examination assessed uterine enlargement, tenderness, or palpable masses. Speculum examination was performed to identify cervical or vaginal lesions that could contribute to bleeding, while bimanual examination assessed uterine size, mobility, contour, and adnexal findings. Clinical findings were documented before histopathological diagnosis to reduce interpretation bias during subsequent correlation.

Transvaginal ultrasonography was performed using a high-frequency transvaginal probe. Endometrial thickness was measured in the longitudinal uterine plane at the point of maximum double-layer thickness, and the presence of focal lesions, suspected endometrial polyps, submucosal fibroids, intracavitary fluid, or abnormal vascularity was recorded. Because endometrial thickness varies across the perimenopausal cycle, ultrasound findings were interpreted together with bleeding pattern and clinical risk factors rather than as a standalone diagnostic test. For analytical stratification, endometrial thickness was categorized as <5 mm, 5–9 mm, and ≥10 mm, while ≥5 mm was treated as sonographic

thickening requiring closer clinicopathological interpretation. Focal lesions identified on ultrasound were documented separately because blind endometrial sampling may miss localized intracavitary pathology.

Endometrial sampling was performed for enrolled participants using Pipelle biopsy as the primary outpatient sampling method. When Pipelle sampling was inadequate or when ultrasound suggested focal intracavitary pathology, hysteroscopic-guided biopsy or dilation and curettage was performed according to clinical indication. Tissue specimens were fixed in 10% formalin and submitted for histopathological processing. Sections were prepared using routine paraffin embedding and hematoxylin and eosin staining. Histopathological diagnosis was made by experienced pathologists and categorized as proliferative endometrium, secretory endometrium, atrophic endometrium, endometrial polyp, simple hyperplasia without atypia, complex hyperplasia with atypia, endometrial carcinoma, or other benign findings. For grouped analysis, proliferative, secretory, atrophic, polypoid, and other non-neoplastic benign findings were classified as benign; hyperplasia without atypia and hyperplasia with atypia were reported distinctly; and endometrial carcinoma was classified as malignant. This separation was used to prevent misclassification of non-atypical hyperplasia and to maintain clarity between benign, hyperplastic, premalignant, and malignant outcomes.

The primary outcome was histopathological diagnosis of the endometrium. Secondary outcomes included the frequency of abnormal bleeding patterns, ultrasound endometrial thickness categories, focal ultrasound lesions, and the association of clinical and sonographic factors with high-risk histopathology. High-risk histopathology was defined for analysis as atypical hyperplasia or endometrial carcinoma. Clinical exposure variables included age group, BMI category, diabetes mellitus, hypertension, thyroid disorder, parity, and bleeding pattern. Sonographic exposure variables included endometrial thickness category and presence of focal lesions. Potential confounding by age, BMI, and diabetes was addressed by including these variables in multivariable logistic regression when evaluating factors associated with high-risk histopathology.

The sample size was calculated for a descriptive cross-sectional design using the single-proportion formula $n = Z^2p(1-p)/d^2$. Using an estimated prevalence of abnormal uterine bleeding in perimenopausal women of 30%, a 95% confidence level, and a 5% margin of error, the minimum required sample size was calculated as 320 participants. To compensate for incomplete records or inadequate samples, 350 women were enrolled consecutively.

Data were entered and analyzed using SPSS version 26. Continuous variables were summarized as mean ± standard deviation when approximately normally distributed, while categorical variables were summarized as frequencies and percentages. Histopathological categories were reported with their exact denominators. Associations between categorical clinical or ultrasound variables and histopathological outcomes were assessed using the chi-square test or Fisher's exact test where cell counts were small. Binary logistic regression was planned to identify factors associated with high-risk histopathology, with results to be reported as odds ratios with 95% confidence intervals and p-values. Variables considered clinically relevant, including age above 50 years, BMI ≥30 kg/m², diabetes, endometrial thickening, and focal ultrasound lesions, were included in the model based on biological plausibility and prior evidence. A p-value <0.05 was considered statistically significant.

Data quality was maintained through structured data collection, consistent operational definitions, and verification of completed forms before data entry. Ultrasound and histopathological findings were recorded systematically to permit direct clinicopathological correlation. Histopathology served as the reference diagnostic standard. To reduce observer-related bias, histopathological interpretation was performed by experienced pathologists, and a subset of slides was reviewed for quality assurance. Patient confidentiality was maintained by using anonymized study records, and study procedures were conducted in accordance with ethical principles for human participant research.

RESULTS

A total of 350 perimenopausal women with abnormal uterine bleeding were included in the analysis. The age of participants ranged from 40 to 55 years, with a mean age of 47.8 ± 4.2 years. The mean body mass index was 28.3 ± 5.1 kg/m². Multiparity was the most frequent parity category, reported in 60.0% of participants, while 25.0% were nulliparous and 15.0% had parity of 1–2. Comorbidities were present in 45.0% of women, including diabetes mellitus in 20.0%, hypertension in 18.0%, and thyroid disorders in 7.0%.

Table 1. Baseline Demographic and Clinical Characteristics of Perimenopausal Women With Abnormal Uterine Bleeding (n = 350)

Variable	Value
Age, years, mean ± SD	47.8 ± 4.2
Age range, years	40–55
Body mass index, kg/m², mean ± SD	28.3 ± 5.1
Multiparous, %	60.0
Nulliparous, %	25.0
Parity 1–2, %	15.0
Any comorbidity, %	45.0
Diabetes mellitus, %	20.0
Hypertension, %	18.0
Thyroid disorder, %	7.0

The study population represented a typical perimenopausal abnormal uterine bleeding cohort, with a mean age of 47.8 years and mean BMI in the overweight range. Nearly half of the participants had at least one comorbidity, with diabetes mellitus and hypertension being the most frequently reported metabolic conditions.

Heavy menstrual bleeding was the most common clinical presentation, reported by 193 women. Intermenstrual bleeding was observed in 88 participants, prolonged menstrual bleeding in 53, and postcoital spotting in 16. Associated symptoms included fatigue in 105 women, pelvic discomfort in 63, and dysmenorrhea in 42.

Table 2. Bleeding Patterns and Associated Symptoms Among Perimenopausal Women With Abnormal Uterine Bleeding (n = 350)

Clinical Feature	n	%
Heavy menstrual bleeding	193	55.1
Intermenstrual bleeding	88	25.1
Prolonged menstrual bleeding	53	15.1
Postcoital spotting	16	4.6
Fatigue	105	30.0
Pelvic discomfort	63	18.0
Dysmenorrhea	42	12.0

Heavy menstrual bleeding was the dominant bleeding pattern, affecting more than half of the study population. Intermenstrual bleeding was the second most frequent presentation, affecting approximately one-quarter of participants. Fatigue was the most common associated symptom, reported by 30.0% of women, reflecting the clinical burden of abnormal uterine bleeding in this population.

Transvaginal ultrasound showed normal endometrial thickness below 5 mm in 60.0% of women, while 40.0% had endometrial thickening of 5 mm or more. Endometrial thickness categories were reported as <5 mm in 60.0%, 5–9 mm in 25.0%, and ≥10 mm in 15.0% of participants. Focal lesions were reported in 25.0% of women, including suspected endometrial polyps in 15.0% and submucosal fibroids in 10.0%. Endometrial fluid collection was reported in 5.0%.

Transvaginal ultrasound identified endometrial thickening in 40.0% of participants and focal intracavitary or structural lesions in 25.0%. These findings support the role of ultrasound as a useful

first-line assessment tool for identifying women who may require targeted endometrial evaluation, although ultrasound findings alone cannot establish histopathological diagnosis.

Table 3. Transvaginal Ultrasound Findings in Perimenopausal Women With Abnormal Uterine Bleeding (n = 350)

Ultrasound Finding	Reported %
Endometrial thickness <5 mm	60.0
Endometrial thickness ≥5 mm	40.0
Endometrial thickness 5–9 mm	25.0
Endometrial thickness ≥10 mm	15.0
Any focal lesion	25.0
Suspected endometrial polyp	15.0
Suspected submucosal fibroid	10.0
Endometrial fluid collection	5.0

Histopathological examination demonstrated a broad spectrum of endometrial patterns. Proliferative endometrium was the most frequent single histopathological finding, observed in 98 women, followed by secretory endometrium in 55, endometrial polyps in 53, atrophic endometrium in 42, complex hyperplasia with atypia in 32, simple hyperplasia without atypia in 21, endometrial carcinoma in 18, and other benign findings in 31.

Table 4. Histopathological Patterns of Endometrial Samples (n = 350)

Histopathological Finding	n	%
Proliferative endometrium	98	28.0
Secretory endometrium	55	15.7
Atrophic endometrium	42	12.0
Endometrial polyp	53	15.1
Simple hyperplasia without atypia	21	6.0
Complex hyperplasia with atypia	32	9.1
Endometrial carcinoma	18	5.1
Other benign findings	31	8.9
Total	350	100.0

Benign endometrial patterns were the predominant histopathological findings. Proliferative endometrium accounted for the largest proportion, followed by secretory endometrium, endometrial polyps, and atrophic endometrium. Hyperplastic lesions were identified in 53 women when simple hyperplasia without atypia and complex hyperplasia with atypia were combined, while carcinoma was detected in 18 women.

To address inconsistency in the original categorization, histopathological findings were regrouped into clinically interpretable categories. Benign findings included proliferative, secretory, atrophic, polypoid, and other benign endometrial patterns. Hyperplasia without atypia was reported separately because it should not be merged uncritically with atypical premalignant disease. High-risk pathology was defined as complex hyperplasia with atypia or endometrial carcinoma.

Table 5. Clinically Grouped Histopathological Categories (n = 350)

Histopathological Category	Included Findings	n	%
Benign endometrial findings	Proliferative, secretory, atrophic, polyp, other benign	279	79.7
Hyperplasia without atypia	Simple hyperplasia without atypia	21	6.0
Atypical hyperplasia	Complex hyperplasia with atypia	32	9.1
Malignant pathology	Endometrial carcinoma	18	5.1
High-risk pathology	Atypical hyperplasia or carcinoma	50	14.3
Any hyperplasia or carcinoma	Simple hyperplasia, atypical hyperplasia, carcinoma	71	20.3

After regrouping, benign endometrial findings accounted for 279 cases, representing 79.7% of the study population. Hyperplasia without atypia was present in 6.0%, atypical hyperplasia in 9.1%, and carcinoma in 5.1%. High-risk histopathology, defined as atypical hyperplasia or carcinoma, was present in 50 women, representing 14.3% of the total sample. When all hyperplastic lesions and carcinoma were combined, clinically relevant non-benign pathology was present in 71 women, representing 20.3% of participants.

The manuscript reported that women with endometrial thickening on ultrasound had higher proportions of premalignant and malignant histopathological findings, and that women with focal lesions were more likely to have polyps on histopathology. However, exact cross-tabulated counts by ultrasound category and histopathological outcome were not provided. Therefore, valid chi-square statistics, odds ratios, confidence intervals, or exact p-values could not be reconstructed from the available aggregated data.

Table 6. Available Ultrasound–Histopathology Correlation Findings

Correlation Variable	Reported Finding
Premalignant lesions among women with endometrial thickening	35.0%
Malignant lesions among women with endometrial thickening	12.0%
Focal lesions associated with histopathological polyps	$p < 0.01$
Age >50 years associated with premalignant or malignant pathology	$p < 0.05$
BMI ≥30 kg/m² associated with premalignant or malignant pathology	$p < 0.05$
Diabetes associated with premalignant or malignant pathology	$p < 0.05$

The available findings suggest that sonographic endometrial thickening and focal lesions were associated with abnormal histopathological patterns. However, because exact denominators and cross-tabulated values were not provided for these comparisons, the strength and precision of these associations cannot be fully assessed. Similarly, age above 50 years, BMI ≥30 kg/m², and diabetes were reported as statistically significant factors associated with premalignant or malignant pathology, but the absence of odds ratios and 95% confidence intervals limits interpretation of their independent contribution.

Reviewer-Style Statistical Note: The manuscript should include a complete regression table before publication. The recommended table should report crude and adjusted odds ratios with 95% confidence intervals and p-values for age >50 years, BMI ≥30 kg/m², diabetes, hypertension, endometrial thickness category, and focal ultrasound lesions, using high-risk histopathology as the dependent variable. Without these data, the term "predictor" should be used cautiously, and the results should be described as associations rather than independent predictive effects.

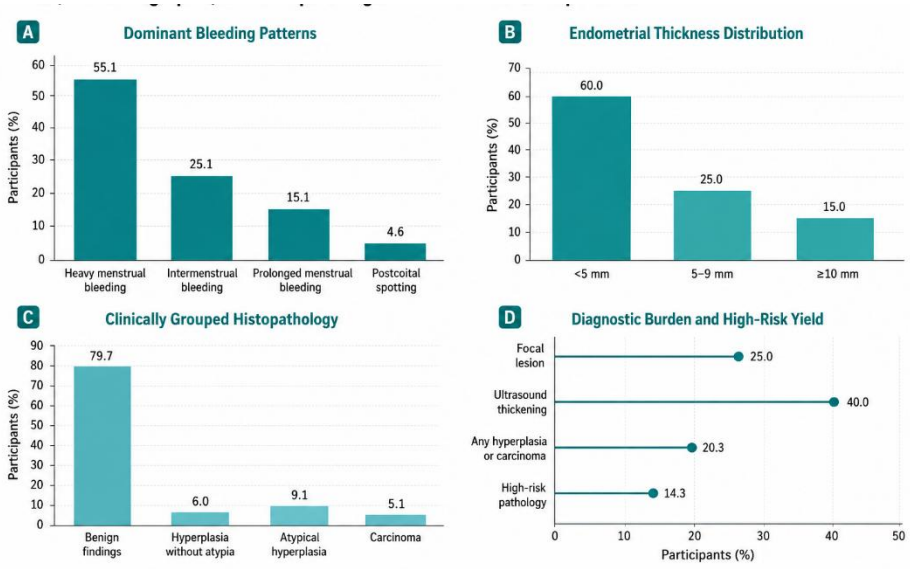

Figure 1 Clinical, ultrasonographic, and histopathological profile of perimenopausal women with abnormal uterine bleeding. Panel A shows the dominant bleeding phenotype, with heavy menstrual bleeding reported in 55.1% of participants. Panel B presents endometrial thickness categories on transvaginal ultrasound, showing thickening of ≥5 mm in 40.0% of women. Panel C displays the corrected clinically grouped histopathological spectrum, with benign findings in 79.7%, hyperplasia without atypia in 6.0%, atypical hyperplasia in 9.1%, and carcinoma in 5.1%. Panel D summarizes clinically important diagnostic yield, highlighting high-risk pathology in 14.3% and any hyperplasia or carcinoma in 20.3% of the study population.

Overall, the results show that most perimenopausal women with abnormal uterine bleeding had benign histopathological findings, but a clinically important subgroup had hyperplasia, atypical hyperplasia, or

carcinoma. Heavy menstrual bleeding was the most common presenting symptom, while ultrasound frequently identified endometrial thickening and focal lesions. Histopathology remained essential for definitive diagnosis, particularly because high-risk pathology was identified in 14.3% of participants and any hyperplasia or carcinoma was present in 20.3%.

DISCUSSION

This study evaluated the clinical presentation, ultrasound findings, and histopathological spectrum of perimenopausal women presenting with abnormal uterine bleeding and undergoing endometrial sampling. The principal finding was that most women had benign histopathological patterns, but a clinically important subgroup had hyperplasia, atypical hyperplasia, or carcinoma. After correcting the histopathological grouping, benign endometrial findings accounted for 79.7% of cases, while hyperplasia without atypia, atypical hyperplasia, and carcinoma accounted for 6.0%, 9.1%, and 5.1%, respectively. High-risk pathology, defined as atypical hyperplasia or carcinoma, was present in 14.3% of women, while any hyperplasia or carcinoma was present in 20.3%. These findings support the clinical relevance of histopathological assessment in perimenopausal abnormal uterine bleeding, particularly because a symptom-driven approach alone would not reliably distinguish benign bleeding from clinically significant endometrial disease (10).

Heavy menstrual bleeding was the dominant clinical presentation, affecting 55.1% of participants, followed by intermenstrual bleeding in 25.1% and prolonged menstrual bleeding in 15.1%. This pattern is consistent with the expected clinical phenotype of perimenopausal abnormal uterine bleeding, where ovulatory dysfunction, irregular hormonal exposure, and structural lesions may coexist. Previous studies have similarly reported heavy menstrual bleeding as a common presentation among perimenopausal women undergoing endometrial evaluation, although the relative proportions vary across clinical settings and referral populations (11,12). In the present study, associated symptoms such as fatigue, pelvic discomfort, and dysmenorrhea were also observed, but these symptoms should be interpreted as markers of clinical burden rather than diagnostic indicators of high-risk histopathology unless supported by direct comparative analysis.

Transvaginal ultrasound identified endometrial thickening of ≥5 mm in 40.0% of women and focal lesions in 25.0%. These findings reinforce the value of ultrasound as a first-line diagnostic tool for identifying women who may require targeted endometrial assessment. However, ultrasound should not be interpreted in isolation in perimenopausal women because endometrial thickness changes across the menstrual cycle and may be influenced by irregular ovulation. The findings of this study therefore support an integrated diagnostic approach in which sonographic endometrial thickness, focal intracavitary lesions, clinical risk factors, and bleeding pattern are considered together before deciding the urgency and method of endometrial sampling (13).

Histopathology remained the definitive diagnostic component of the evaluation. The predominance of proliferative endometrium, secretory endometrium, atrophic endometrium, and polyps reflects the broad range of benign endometrial changes that may occur during the perimenopausal transition. At the same time, the detection of atypical hyperplasia and carcinoma in a notable minority is clinically important because these lesions require timely management and follow-up. Studies from regional and international settings have similarly shown that although benign pathology is most common in perimenopausal abnormal uterine bleeding, endometrial hyperplasia and carcinoma are sufficiently frequent to justify tissue diagnosis in appropriately selected women (14,15).

The corrected grouping of histopathological categories is important for clinical interpretation. In the original reporting, benign, premalignant, malignant, and “other” categories were not fully aligned with the detailed histopathological table. In the revised classification, benign patterns were separated from hyperplasia without atypia, atypical hyperplasia, and carcinoma. This distinction improves interpretability because hyperplasia without atypia does not carry the same clinical risk as atypical

hyperplasia, while atypical hyperplasia and carcinoma represent high-risk pathology requiring more urgent gynecological management. Such categorization is more useful for clinical decision-making and avoids overestimating or underestimating premalignant disease burden.

The manuscript reported that women with endometrial thickening had higher proportions of premalignant and malignant findings, and that focal lesions on ultrasound were associated with histopathological polyps. It also reported that age above 50 years, BMI ≥30 kg/m², and diabetes were statistically associated with premalignant or malignant pathology. These findings are biologically plausible and consistent with established risk pathways linking increasing age, obesity, metabolic dysfunction, and endometrial neoplasia (16,17). However, because exact cross-tabulated counts, odds ratios, confidence intervals, and full regression outputs were not provided, these factors should be described as associated features rather than independent predictors. A complete multivariable model is necessary before concluding that these variables independently predict high-risk histopathology.

The association of obesity and diabetes with high-risk endometrial pathology has important clinical implications. Obesity may increase peripheral estrogen production through aromatization in adipose tissue, while insulin resistance and diabetes may contribute to endometrial proliferation through metabolic and inflammatory pathways. In clinical practice, this means that perimenopausal women with abnormal uterine bleeding and metabolic risk factors should be assessed more carefully, even when ultrasound findings are borderline. The present study supports this risk-stratified approach, but future reporting should quantify risk using adjusted odds ratios and 95% confidence intervals to clarify the independent contribution of each factor.

The findings also highlight the complementary roles of Pipelle biopsy and hysteroscopic-guided sampling. Pipelle biopsy is suitable for outpatient assessment and diffuse endometrial pathology, but focal lesions such as polyps and submucosal fibroids may be missed by blind sampling. Because 25.0% of participants had focal lesions on ultrasound and 15.1% had histopathological polyps, targeted assessment may be particularly useful when ultrasound suggests localized intracavitary disease. Hysteroscopy or directed biopsy should therefore be considered when ultrasound demonstrates focal pathology, when bleeding persists despite benign sampling, or when the initial sample is inadequate (18).

The main strength of this study is that it combines clinical presentation, ultrasound assessment, and histopathological confirmation in a relatively large perimenopausal sample of 350 women. This provides clinically relevant information for local gynecological practice and emphasizes the importance of not relying on symptoms alone. The corrected results also present a clearer estimate of high-risk pathology by separating benign findings, non-atypical hyperplasia, atypical hyperplasia, and carcinoma. This improves the clinical usefulness of the study because management decisions differ substantially across these categories.

The study also has limitations. First, its cross-sectional design allows estimation of clinicopathological patterns and associations but cannot establish causality or disease progression. Second, recruitment from tertiary-care settings may introduce referral bias because more symptomatic or higher-risk women are more likely to present for specialist evaluation. Third, the use of a fixed endometrial thickness threshold in perimenopausal women should be interpreted cautiously because endometrial thickness varies with cycle phase. Fourth, the absence of complete cross-tabulated ultrasound–histopathology data limits the ability to independently verify reported associations. Fifth, the regression findings require fuller reporting, including crude and adjusted odds ratios, confidence intervals, reference categories, and model covariates. Addressing these limitations would substantially strengthen the manuscript's methodological transparency and publication readiness.

Overall, the study demonstrates that perimenopausal abnormal uterine bleeding is most commonly associated with benign endometrial pathology, but a meaningful proportion of women have hyperplasia, atypical hyperplasia, or carcinoma. The results support an integrated diagnostic pathway using clinical

assessment, ultrasound, and histopathology, particularly in women with older age, obesity, diabetes, endometrial thickening, or focal ultrasound lesions. With strengthened statistical reporting and clearer classification of histopathological outcomes, the study can offer useful evidence for risk-based endometrial assessment in perimenopausal women.

CONCLUSION

In perimenopausal women presenting with abnormal uterine bleeding, benign endometrial patterns were the predominant histopathological findings; however, hyperplasia, atypical hyperplasia, and carcinoma were identified in a clinically important minority. Heavy menstrual bleeding was the most frequent presenting symptom, while ultrasound commonly demonstrated endometrial thickening and focal lesions. Histopathological examination remained essential for definitive diagnosis because clinical presentation and ultrasound findings alone cannot reliably exclude high-risk pathology. Older age, obesity, diabetes, endometrial thickening, and focal sonographic lesions may help identify women requiring earlier or more targeted endometrial assessment, although complete regression reporting is needed to confirm their independent predictive value. These findings support a combined clinical, ultrasonographic, and histopathological approach for timely diagnosis and risk stratification of perimenopausal abnormal uterine bleeding.

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