IJPSR (2026), Volume 17, Issue 5 (Research Article)

INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES AND RESEARCH

Received on 10 December 2025; received in revised form, 09 January 2026; accepted, 14 January 2026; published 01 May 2026

HISTOPATHOLOGICAL ANALYSIS OF ENDOMETRIAL TISSUE IN CASES OF ABNORMAL UTERINE BLEEDING - A 2-YEAR RETROSPECTIVE STUDY IN A TERTIARY CARE HOSPITAL

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Keywords:

Abnormal uterine bleeding, Endometrial histopathology, Endometrial hyperplasia, Endometrial carcinoma

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ABSTRACT: Background: Abnormal uterine bleeding (AUB) is one of the most common gynaecological complaints and a major indication for endometrial sampling. Histopathological evaluation remains the gold standard for identifying functional, organic, premalignant, and malignant lesions. **Objective:** To analyse the spectrum of histopathological patterns of endometrium in women presenting with AUB and to assess the association of age with significant endometrial pathology. **Materials and Methods:** This retrospective study included all endometrial biopsy and hysterectomy specimens received for AUB over a period of two years in a tertiary care hospital. Histopathological findings were categorized and correlated with age groups. Statistical analysis included chi-square test and binary logistic regression. **Results:** The most common finding was proliferative endometrium followed by pregnancy-related changes and secretory endometrium. Hyperplasia and carcinoma were predominantly seen in women above 40 years. **Conclusion:** Endometrial histopathology shows a strong age-dependent distribution. Increasing age is a significant predictor of organic and premalignant/malignant endometrial pathology, reinforcing the importance of routine histopathological evaluation in women with AUB.

INTRODUCTION: Abnormal uterine bleeding (AUB) is one of the most frequent gynaecological presentations encountered across age groups and constitutes a significant burden on healthcare services. Its etiological spectrum is broad, ranging from functional disturbances of the endometrium to structural lesions and malignancies. Histopathological evaluation of endometrial tissue remains the gold standard for identifying the underlying cause and guiding management. The International Federation of Gynaecology and Obstetrics (FIGO) PALM–COEIN classification provides a standardized framework, dividing causes into structural (Polyp, Adenomyosis, Leiomyoma, Malignancy and hyperplasia) and non-structural (Coagulopathy, Ovulatory dysfunction, Endometrial, Iatrogenic, Not yet classified) categories [1, 2]. Histological studies worldwide consistently show age-specific patterns: functional (proliferative/ secretory) and pregnancy-related changes dominate in younger women, while hyperplasia, atrophy, and carcinoma are more frequent in peri- and postmenopausal women [3, 4, 5, 6].

The objective of this study is to analyse the spectrum of histopathological patterns of endometrium in women presenting with AUB in a Tertiary Care Hospital and to assess the association of age with significant endometrial pathology.

QUICK RESPONSE CODE

DOI: 10.13040/IJPSR.0975-8232.17(5).1635-40

This article can be accessed online on www.ijpsr.com

DOI link: https://doi.org/10.13040/IJPSR.0975-8232.17(5).1635-40

MATERIALS AND METHODS:

Study Design and Period: This was a retrospective observational study done in the

Department of Pathology, Tezpur Medical College and Hospital, between 1 June 2023 to 31 May 2025.

Inclusion Criteria: Endometrial tissue samples from patients with AUB obtained by dilatation & curettage, endometrial biopsy, and hysterectomy received with a clinical diagnosis of AUB during the study period were included in the study.

Exclusion Criteria: Samples that were autolyzed and inadequate for interpretation were excluded.

Ethical Consideration: This study does not involve any *in-vivo* experiment on humans or animals. It is a retrospective observational study for which ethical clearance was obtained from Institutional Human Ethical Committee, Tezpur Medical College and Hospital, Assam vide IEC Sl. No: 2025/064/TMC & H dated 11/10/2025. Necessary consent was taken and full confidentiality of the patient was maintained.

Study Procedure: Specimens were processed routinely, fixed in 10% buffered formalin followed by paraffin embedding, microtome sectioning at 4–5 µm, and staining with haematoxylin and eosin.

Study Variables: Histological categorization was done based on our findings. For binary logistic regression analysis, histopathological findings were dichotomized into significant pathology (endometrial polyp, atrophic endometrium, endometrial hyperplasia, and carcinoma) and non-significant pathology (functional endometrium, pregnancy-related changes, and inflammatory lesions) based on their clinical and prognostic relevance. Findings were then categorised according to age groups.

Data Analysis: Data was collected from histopathological records and analysed using SPSS (Statistical Package for the Social Sciences) version 23.0 (Released 2015, IBM Corp, Armonk NY) software (IBM Corp 2015). Associations between age and histopathological findings were evaluated using Chi-square test (significance at $p < 0.05$) and Logistic Regression Analysis (95% Confidence Interval). Visual representation included tables, charts and photomicrographs.

RESULTS:

Method of Sample Collection: Total 516 endometrial samples.

Procedures: Dilatation and curettage (D&C), and Total Abdominal hysterectomy (TAH), endometrial biopsy.

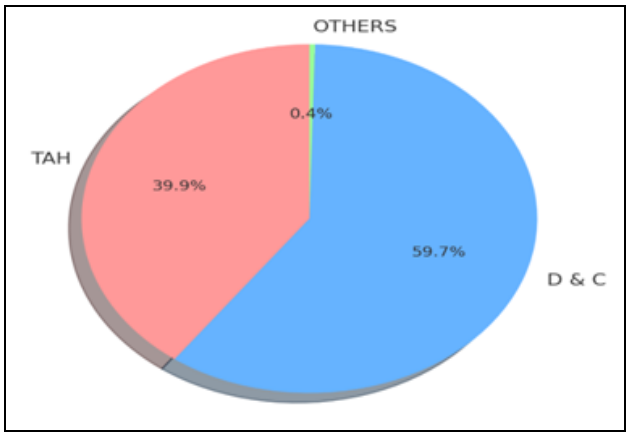

FIG. 1: METHOD OF SAMPLE COLLECTION

Age Wise Distribution:

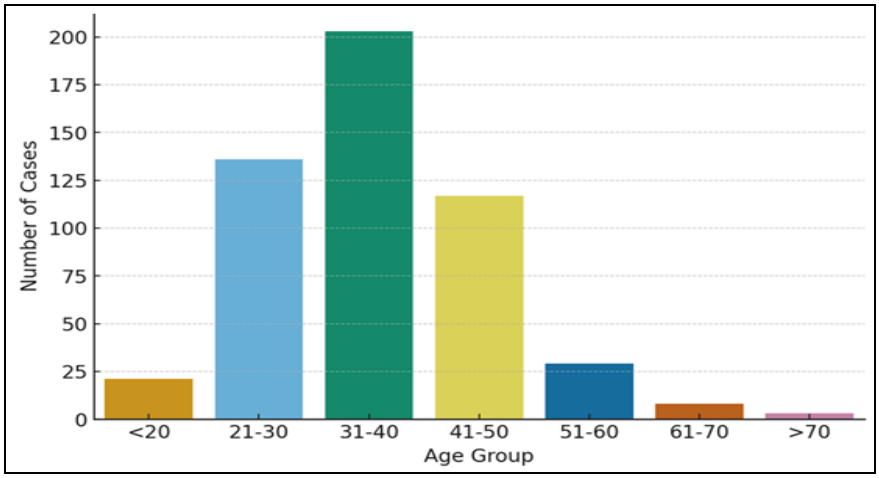

FIG. 2: AGE WISE DISTRIBUTION

Histopathological Patterns:

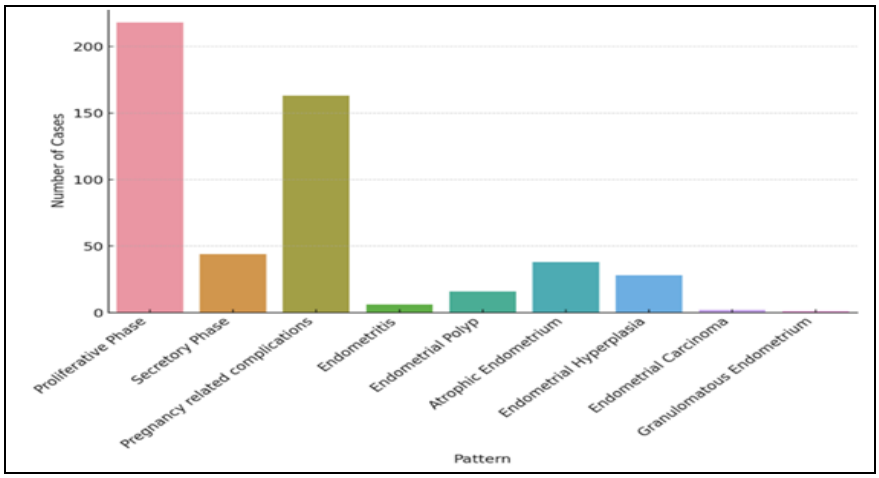

FIG. 3: DISTRIBUTION OF HISTOLOGICAL PATTERNS

Photomicrographs:

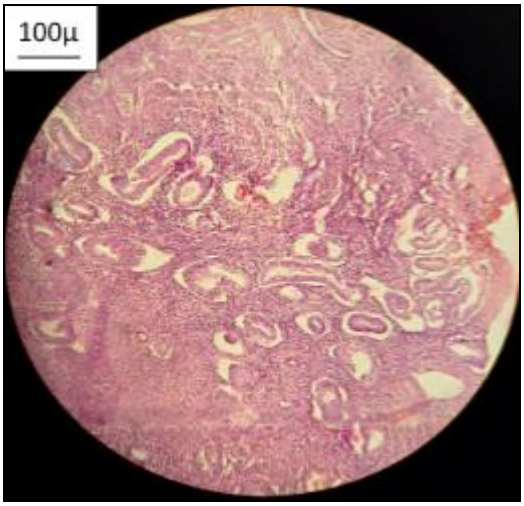

FIG. 4: PROLIFERATIVE ENDOMETRIUM (STAIN–HAEMATOXYLIN & EOSIN; MAGNIFICATION-10X)

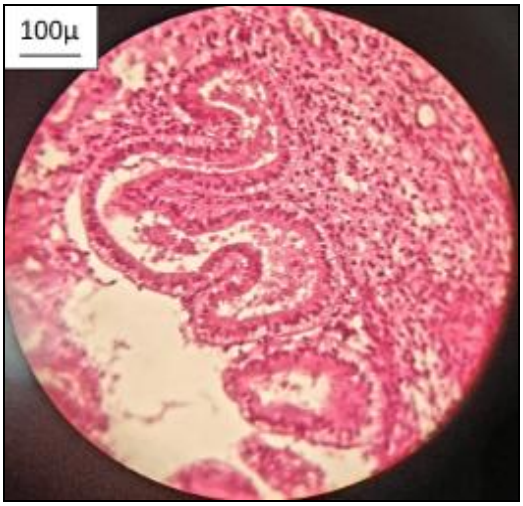

FIG. 5: SECRETORY ENDOMETRIUM (STAIN - HAEMATOXYLIN & EOSIN; MAGNIFICATION - 40X)

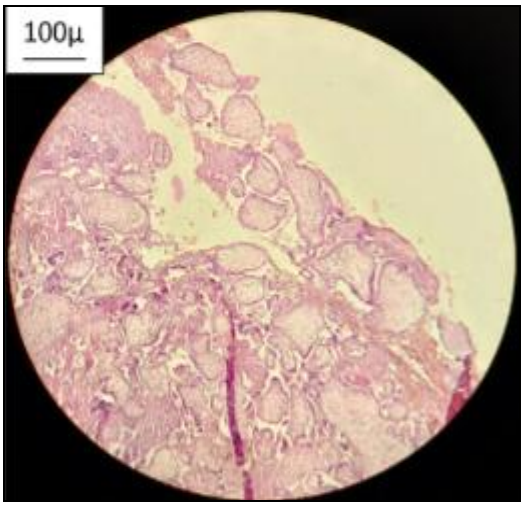

FIG. 6: RETAINED PRODUCT OF CONCEPTION (STAIN - HAEMATOXYLIN & EOSIN; MAGNIFICATION - 10X)

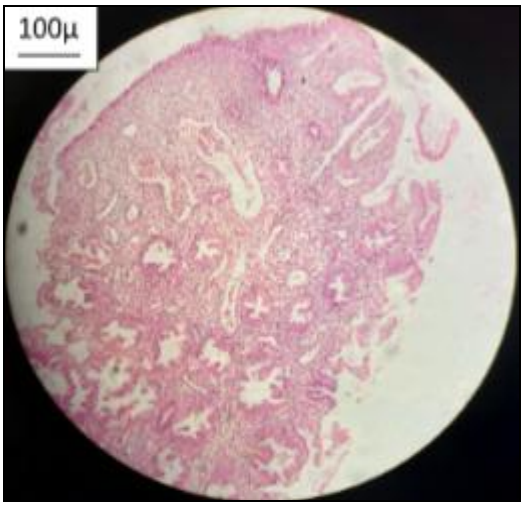

FIG. 7: ENDOMETRIAL POLYP (STAIN - HAEMATOXYLIN & EOSIN; MAGNIFICATION - 10X)

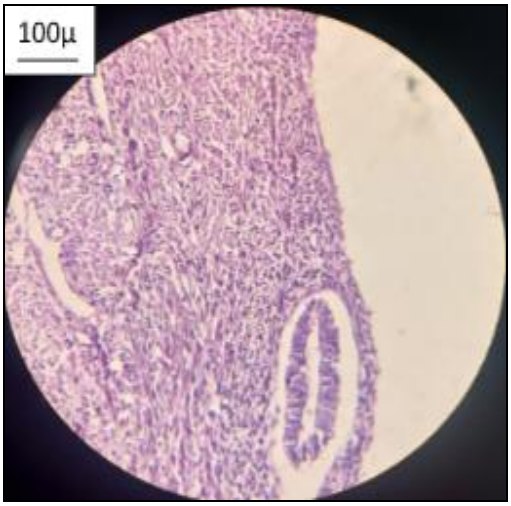

FIG. 8: ATROPHIC ENDOMETRIUM (STAIN - HAEMATOXYLIN & EOSIN; MAGNIFICATION - 40X)

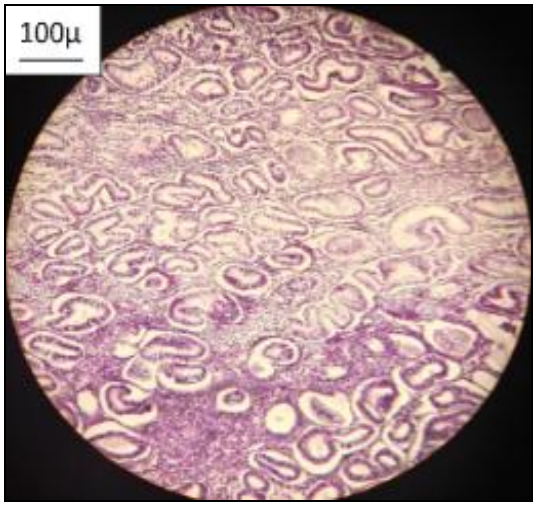

FIG. 9: ENDOMETRIAL HYPERPLASIA (STAIN - HAEMATOXYLIN & EOSIN; MAGNIFICATION - 10X)

Distribution of Histopathological Patterns with Age:

TABLE 1: DISTRIBUTION OF ENDOMETRIAL HISTOLOGICAL PATTERNS ACCORDING TO AGE

Patterns	<20	21-30	31-40	41-50	51-60	61-70	>70	Total
Proliferative Phase	3	15	109	81	9	1	0	218
Secretory Phase	1	9	23	9	2	0	0	44
Pregnancy related complications	14	105	42	2	0	0	0	163
Endometritis	0	1	3	0	0	1	1	6
Endometrial Polyp	3	5	7	0	0	0	1	16
Atrophic Endometrium	0	1	5	11	15	6	0	38
Endometrial Hyperplasia	0	0	13	13	2	0	0	28
Endometrial Carcinoma	0	0	0	1	0	0	1	2
Granulomatous Endometrium	0	0	1	0	0	0	0	1
Total	21	136	203	117	28	8	3	516

Chi-square Test:

TABLE 2: CHI-SQUARE TEST

Parameter	Value
Chi-square (χ^2)	551.08
Degrees of freedom (df)	48
p-value	< 0.001
Statistical significance	Highly significant

Model Details:

Dependent Variable (Outcome): Significant pathology (endometrial polyp, atrophy, hyperplasia, carcinoma = 1; others = 0).

Predictor: Age group (treated as ordinal numeric, <20 = 0 … >70 = 6).

Binary Logistic Regression Analysis:

TABLE 3: LOGISTIC REGRESSION ANALYSIS

Variable	β coefficient	Standard Error (SE)	Wald χ^2	Odds Ratio (OR)	95% Confidence Interval for OR	p-value
Constant	−3.81	0.42	82.6	—	—	<0.001
Age group (Ordinal)	0.92	0.13	50.1	2.51	1.95 – 3.25	<0.001

DISCUSSION: In our study, amongst 516 cases of AUB received over a period of 2 years, the most common histopathological pattern was proliferative phase-218 cases (42.2%), followed by pregnancy-related complications -163 cases(31.6%). When histopathological findings were categorised according to age, it clearly showed age-dependent transition with younger age showing predominance of pregnancy-related & proliferative changes, middle age women showing proliferative & hyperplastic changes. And older age women with AUB showed atrophic endometrium and

malignancy. Proliferative endometrium, the most common histopathological finding in abnormal uterine bleeding, reflects anovulatory cycles and hormonal imbalance in reproductive and perimenopausal women. Similar predominance of proliferative endometrium has been widely reported in both Indian and international studies [2, 6, 9].

A highly significant association between age group and histopathological pattern was observed on Chi-square analysis ($\chi^2 = 551.08$, df = 48, $p < 0.001$), indicating that endometrial pathology in AUB is strongly age-dependent. This finding is in agreement with standard pathology texts and multiple studies that describe a progressive shift from functional to organic and premalignant lesions with increasing age [2, 3, 10].

Pregnancy-related pathology was the leading cause of AUB in women below 30 years, consistent with earlier studies highlighting gestational changes and retained products as common aetiologies in this age group [7, 11].

Atrophic endometrium predominated in postmenopausal women, reflecting oestrogen deficiency and endometrial fragility, a finding that carries clinical importance due to its association with underlying malignancy [2, 12, 13]. Endometrial hyperplasia was mainly observed in women above 40 years, supporting its role as a premalignant lesion related to prolonged oestrogen exposure [2, 14, 15].

Finally, binary logistic regression analysis, where age was used as an ordinal variable, confirmed advancing age as a strong predictor of significant pathology, with odds increasing 2.5 times per age-group increment. This quantitative risk estimate aligns with recent regression-based and nomogram studies that identify age as an independent and robust predictor of premalignant and malignant endometrial lesions in women with AUB [16–20].

CONCLUSION: This study demonstrates a broad spectrum of endometrial histopathological patterns in abnormal uterine bleeding with a clear age-dependent distribution. Proliferative endometrium was the most common finding, while pregnancy-related changes predominated in younger women and atrophic endometrium, hyperplasia, and carcinoma were more frequent in older age groups. Statistical analysis confirmed a significant association between age and histopathological diagnosis.

Clinically, these findings emphasize the importance of routine histopathological evaluation of endometrial samples, particularly in perimenopausal and postmenopausal women. Age-based risk stratification supported by histopathology aids in early detection of premalignant and malignant lesions and guides appropriate patient management.

The study is limited by its retrospective design, single centre nature and lack of imaging correlation and absence of clinical follow up. Nevertheless, the large sample size and systematic histopathological assessment strengthen the relevance of the findings.

ACKNOWLEDGMENT: We are thankful to our histopathology technicians and attendants for assisting us during the conduct of this research.

Funding Statement: No funding has been received from any organization, individual, or party for this research.

Authors' Contribution: All the authors have significantly contributed in concept, study designing, data acquisition, data analysis, and writing of the manuscript.

Data Availability: Data are available with the authors and can be retrieved as and when required.

CONFLICT OF INTEREST: There are no conflicts of interest for this research work.

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How to cite this article:
Jain P, Chelleng KK, Barua A, Gogoi G and Pegu S: Histopathological analysis of endometrial tissue in cases of abnormal uterine bleeding — a 2-year retrospective study in a tertiary care hospital. Int J Pharm Sci & Res 2026; 17(5): 1635-40. doi: 10.13040/IJPSR.0975-8232.17(5).1635-40.