INTRODUCTION

Abnormal uterine bleeding (AUB) is an umbrella term encompassing various forms of uterine bleeding that deviate from the normal menstrual pattern in terms of regularity, volume, duration, or frequency. It is defined as bleeding originating from the uterine corpus in a non-pregnant woman. AUB can manifest as heavy menstrual bleeding, irregular menstrual bleeding, or postmenopausal bleeding, which all differ in severity and cause. This condition has emerged as a leading cause for gynecologic consultation, significantly affecting a substantial portion of the female population. The impact of AUB is widespread, with studies suggesting that up to 14-25% of women in the reproductive age group, and up to 50% of women in the perimenopausal phase, experience some form of abnormal uterine bleeding[1,2,3].

Abnormal uterine bleeding is considered a common complaint, often causing considerable physical and emotional distress to affected individuals. In reproductive-aged women, it frequently leads to impaired quality of life, with symptoms such as heavy menstrual bleeding (HMB) causing anemia, fatigue, and restriction in daily activities. Furthermore, AUB often leads women to seek medical advice as the condition may be associated with underlying pathologies, including uterine fibroids, polyps,

endometrial hyperplasia, and, in more serious cases, malignancy[4]. As women approach perimenopause, the frequency and severity of AUB tend to increase, mainly due to hormonal changes, aging, and the onset of structural uterine abnormalities[5].

The Significance of AUB and its Prevalence

Abnormal uterine bleeding is a condition that varies widely in terms of its prevalence, depending on age, geography, and health conditions. Studies suggest that the **prevalence of AUB in reproductive-age women** ranges from 3% to 30%, with some reports noting that it can affect up to one-third of women at some point in their lives[6]. The condition also disproportionately affects perimenopausal and postmenopausal women, as they are at increased risk of underlying structural uterine changes such as fibroids and endometrial hyperplasia. In postmenopausal women, AUB is particularly concerning because it raises the possibility of malignancy, necessitating a thorough evaluation[6].

Perimenopause is a phase of transition before menopause, generally beginning between 45 and 47 years of age, marked by irregular cycles and hormonal fluctuations, which can contribute to AUB[4]. The World Health Organization (WHO) defines perimenopause as the period

extending from two to eight years before menopause, characterized by a decline in ovarian function and a reduction in estrogen production. This phase is often marked by unpredictable menstrual cycles, with some women experiencing an increase in menstrual flow, while others experience irregular bleeding or skipped periods[4,5].

In terms of structural abnormalities, common causes of AUB during the reproductive years include uterine fibroids (leiomyomas), endometrial polyps, and adenomyosis. As women approach perimenopause, however, conditions like endometrial hyperplasia and carcinoma become more prevalent. This shift in pathology underscores the importance of tailoring diagnostic and therapeutic strategies based on a woman's age and reproductive status[7].

Nomenclature and Classification of AUB

Historically, AUB was described using a variety of inconsistent terms such as menorrhagia, metrorrhagia, and dysfunctional uterine bleeding (DUB). These terms often overlapped and failed to provide clear diagnostic distinctions. In response to this, the **International Federation of Gynecology and Obstetrics (FIGO)** introduced a consensus on the terminology for AUB in 2007. This consensus aimed to standardize

terminology and provide a more comprehensive and clinically relevant classification system. In 2011, FIGO published an updated classification that included the **PALM-COEIN** system, which classifies AUB into structural and non-structural categories based on the underlying pathology. The **PALM-COEIN** system includes the following categories:

- **P** – Polyp (AUB-P)
- **A** – Adenomyosis (AUB-A)
- **L** – Leiomyoma (AUB-L)
- **M** – Malignancy and Hyperplasia (AUB-M)
- **C** – Coagulopathy (AUB-C)
- **O** – Ovulatory Dysfunction (AUB-O)
- **E** – Endometrial (AUB-E)
- **N** – Iatrogenic and Not Otherwise Classified (AUB-N)[7,8].

This classification system has revolutionized the understanding of AUB by categorizing its causes into structural (e.g., polyps, fibroids, endometrial carcinoma) and non-structural factors (e.g., coagulopathies, ovulatory dysfunction). The PALM-COEIN system is instrumental in guiding clinical management, ensuring that both clinicians and patients can communicate effectively about the underlying causes of AUB. It also

facilitates research by providing a unified framework for investigating the etiology of abnormal uterine bleeding[7].

Pathophysiology and Mechanisms of AUB

The pathophysiology of AUB is multifactorial and varies depending on the underlying cause. In cases involving structural abnormalities such as uterine fibroids, polyps, or adenomyosis, the uterus becomes unable to function normally during the menstrual cycle. Fibroids, for instance, can disrupt the endometrial lining, leading to heavy bleeding and irregular cycles. Similarly, polyps or endometrial hyperplasia can result in abnormal bleeding patterns due to abnormal growth of endometrial tissue[7].

In addition to structural causes, **non-structural factors**, such as ovulatory dysfunction, also play a crucial role in AUB. Ovulatory dysfunction, commonly associated with anovulatory cycles, can result in irregular shedding of the endometrium, leading to heavy bleeding. This is often seen in adolescent girls and women in the perimenopausal period due to hormonal fluctuations or insufficient progesterone production during the luteal phase of the menstrual cycle[6,8].

Moreover, coagulopathies (disorders of blood clotting) can significantly contribute to abnormal uterine bleeding. Women with underlying bleeding disorders, such as von Willebrand disease or platelet dysfunction, are at increased risk for heavy or prolonged bleeding episodes. The pathophysiology of coagulopathies in AUB involves a disruption in the normal coagulation cascade, preventing proper clot formation and leading to excessive menstrual flow[8].

One of the critical contributors to primary endometrial dysfunction is a disturbance in the mechanisms responsible for endometrial hemostasis. This can result from a failure to produce adequate vasoconstrictors such as endothelin-1 and prostaglandin F2α, or from excessive production of vasodilators like prostaglandin E2 and prostacyclin, which promote vasodilation and increase blood flow to the uterus. These imbalances can lead to abnormal bleeding, particularly during menstruation, when the endometrial tissue is naturally undergoing shedding[9-11].

Chronic endometrial inflammation or infection may also play a role in AUB. Although chronic endometritis has been recognized as a potential cause of AUB, its exact relationship with abnormal bleeding remains unclear. Chronic endometritis may occur due to infections or

long-term inflammation within the uterus, leading to changes in the endometrial lining that could contribute to abnormal bleeding patterns. However, there is insufficient evidence to classify it definitively as a major cause of AUB, and it is often regarded as a diagnosis of exclusion[12,13].

Diagnostic Approaches to AUB

The diagnosis of AUB requires a systematic approach, starting with a detailed patient history and physical examination. A thorough history helps to identify potential causes, such as medications (e.g., anticoagulants, hormonal therapies), underlying health conditions (e.g., thyroid dysfunction, coagulopathies), or a history of uterine pathology (e.g., fibroids or polyps). Exclusion of pregnancy-related causes is paramount, especially in reproductive-aged women, as pregnancy complications (e.g., miscarriage, ectopic pregnancy) can lead to abnormal bleeding[14].

The next step in the diagnostic workup is endometrial sampling (biopsy), which is considered the gold standard for diagnosing AUB. Endometrial biopsy involves the collection of tissue from the uterine lining for histopathological evaluation. This procedure is critical in

diagnosing conditions such as endometrial hyperplasia, carcinoma, and inflammatory disorders. Additionally, hysteroscopy has gained popularity as a diagnostic tool, as it provides direct visualization of the uterine cavity, allowing for the detection of focal lesions such as polyps, fibroids, and other structural abnormalities[14,3].

Dilation and curettage (D&C) remains a common procedure for obtaining endometrial tissue, especially in settings where hysteroscopy is not readily available. However, D&C has limitations, particularly in its inability to detect focal lesions or malignancy in some cases, especially in postmenopausal women. Therefore, combining D&C with complementary imaging techniques, such as saline infusion sonohysterography or hysteroscopy, can enhance diagnostic accuracy and improve management[3,4].

Ultrasound imaging is also commonly used in the evaluation of AUB, especially to assess for structural lesions such as fibroids and polyps. While it is a non-invasive and widely accessible tool, ultrasound may not always provide sufficient detail for accurate diagnosis, particularly when there are focal lesions in the uterine cavity. In such cases, advanced imaging or direct visualization via hysteroscopy may be necessary[14,8].

REVIEW OF LITERATURE

Liu Z et al., (2007)[15] conducted a systematic review of the medical literature to evaluate the impact of abnormal uterine bleeding (AUB) on health related quality of life (HRQoL) and to quantify the economic burden of AUB from a societal perspective. The search yielded 1009 English- language articles. Ninety-eight studies (including randomized controlled trials, observational studies, and reviews) that met the inclusion and exclusion criteria underwent a full-text review. The prevalence of AUB among women of reproductive age ranged from 10% to 30%. The HRQoL scores from the 36-item Short-Form Health Survey Questionnaire (SF-36) suggested that women with AUB have HRQoL below the 25th percentile of that for the general female population within a similar age range. The conservatively estimated annual direct and indirect economic costs of AUB were approximately $1 billion and $12 billion, respectively. The burden of AUB needs further and more thorough investigation. Additional research should prospectively evaluate the impact of AUB and the value of treatment provided to help guide future health resource allocation and clinical decision-making.

Bhosle A and Fonseca M (2010)[16] did a study to evaluate clinically the gynaecological causes of abnormal uterine bleeding in

perimenopausal women and to correlate clinical evaluation with ultrasonographic and histopathological examination. Retrospective study of 112 perimenopausal women with abnormal uterine bleeding for a period of 6 months. These women were evaluated and clinical, ultrasonographic and histopathological findings were correlated. The major symptom with which the women presented was menorrhagia in 53.3%. All these women underwent D and C followed by medical management or hysterectomy depending upon the diagnosis. The HPE of endometrium was analysed. The HPE of uterus confirmed fibroid uterus and DUB correlated well with ultrasonographic and histopathological examination. Clinical as well as USG proved less useful for diagnosing adenomyosis.

Doraiswami S et al., (2011)[17] conducted a study to analyze the histopathology of the endometrium and identify the causes of abnormal uterine bleeding (AUB) across different age groups. The study was carried out at Sri Ramachandra Medical College and Research Institute, Chennai, India, involving 620 patients who presented with AUB between June 2005 and June 2006. Out of these, 409 cases with isolated endometrial lesions diagnosed by histopathology were included in the final analysis. Statistical analysis using the chi-square test was performed to assess the relationship between age and specific endometrial causes.

The most common age group with AUB was 41–50 years (33.5%), with the predominant finding being a normal cycling endometrium (28.4%). The most frequent pathology across all age groups was a disordered proliferative pattern (20.5%). Other identified causes included pregnancy-related complications (22.7%), benign endometrial polyps (11.2%), endometrial hyperplasia (6.1%), endometrial carcinoma (4.4%), and chronic endometritis (4.2%). The study found a statistically significant association between age and endometrial pathology ($P < 0.05$). In perimenopausal women, AUB was most commonly of dysfunctional origin, while in reproductive-aged women, pregnancy complications should be considered first. The high incidence of disordered proliferative patterns suggests early presentation of these patients.

Khan S et al., (2011)[18] studied the histopathological patterns of the endometrium in patients with abnormal uterine bleeding (AUB) at Madina Teaching Hospital. The study included patients who presented to the outpatient department with AUB, and after meeting specific inclusion and exclusion criteria, they underwent a detailed history taking, physical and gynecological examinations, pelvic ultrasound, and diagnostic D&C. Endometrial biopsy samples were sent for histopathological analysis in the hospital's pathology department. Data was collected over 18 months and analyzed using SPSS version 15. The most common

histopathological finding was proliferative phase endometrium (46.4%), followed by secretory phase endometrium (37.6%). Other findings included cystic (5.2%), adenomatous (3.8%), and atypical (3.6%) hyperplasia, which together accounted for 12.6% of cases. Endometritis was found in 1.4% of cases, atrophic endometrium in 1%, polyps in 0.6%, and endometrial carcinoma in 0.4%. The study concluded that the histopathological patterns in patients with AUB varied widely, regardless of age, parity, or ethnicity.

Forae GD and Aligbe JU (2013)[19] conducted a study aimed to examine the frequency and histological patterns of endometrial lesions in women with abnormal uterine bleeding (AUB) in Benin City, Nigeria. The study reviewed archived H&E-stained slides of endometrial biopsies from the Ashamas Foundation Histopathology Diagnostic Center over a 10-year period. The researchers analyzed clinical data, diagnoses, and biopsy types, and the results were entered into Microsoft Excel and analyzed using SPSS software for descriptive statistics. A total of 231 endometrial lesions were identified, with 207 cases (89.6%) occurring in reproductive and perimenopausal women, and 24 cases (10.4%) in postmenopausal women. The age range of patients was 17 to 86 years, with the highest incidence occurring in the fourth decade, and a mean age of 38.8 years. Among the lesions, the most common finding in

reproductive and premenopausal women was product of conception (27.7%, 64/231 cases), while complex endometrial hyperplasia was the most frequent lesion in postmenopausal women (2.6%, 6/231 cases). The study concluded that the histopathological patterns of endometrial lesions in women with AUB varied, with product of conception being most common in reproductive-aged women and endometrial hyperplasia more frequently observed in perimenopausal women.

Gupta A et al., (2013)[20] studied the causes of abnormal uterine bleeding in perimenopausal women and to correlate their clinical evaluation with ultrasonographic and histopathological examination. The age, parity, menstrual complaints of these patients were noted and clinical diagnosis and ultrasonography were analysed. Finally, histopathology report of the hysterectomy specimen was correlated with the clinical profile of the patient and ultrasonographic findings. Maximum frequency of abnormal uterine bleeding was seen in the age group 40-45 years. Most of the patients were para 3. Menorrhagia was the commonest complaint and fibroid uterus was responsible for abnormal uterine bleeding in 53% of women. Out of 39 women labelled clinically as dysfunctional uterine bleeding, 8 patients were diagnosed with fibroid uterus on ultrasound and in rest of the 31 patients, no organic cause was found. Out of these 31 patients, 4 patients were diagnosed to have adenomyosis on

histopathology and in rest, no gross pathology was detected. Suspected malignancy in all the 3 patients was confirmed on histopathology. Simple endometrial hyperplasia without atypia was present in 19% patients. Clinical, radiological and pathological evaluation correlated well to diagnose fibroids, however clinically as well as ultrasound proved to be of little help in diagnosing adenomyosis.

Qureshi FU and Yusuf AW (2013)[21] conducted a descriptive cross-sectional study comprised of non-gravid women of reproductive age with unpredictable, excessive duration, abnormal volume, and/or abnormal frequency of menses for at least 3 months coming to the outpatient department. The subjects underwent structured history, physical examination and pelvic ultrasonography. Endometrium and hysterectomy specimen were obtained for histopathology where applicable. Possible underlying causes were categorised according to the new classification system. A total of 2109 women comprised 19.6% of total of the 10712 woman who visited the gynecological outpatients clinic, 2109 (19.6%) had abnormal uterine bleeding. PALM-COEIN categorization done in 991(47%) cases that showed 30 (3%) polyp, 15 (15%) adenomyosis, 250 (25%) leiomyoma, 66 (6.6%) malignancy and hyperplasia, 3 (0.3%) coagulopathy, 236 (24%) ovulatory dysfunction, 48 (5%) endometritis, and 53(6%) iatrogenic. The remaining 155 (15%)

cases were uncategorised. The classification should facilitate multi-institutional investigation into the epidemiology, etiology and treatment of women with Abnormal Uterine Bleeding.

Vaidya S et al., (2013)[22] conducted a study to assess the histopathological patterns of the endometrium in women of different age groups presenting with abnormal uterine bleeding (AUB). A total of 403 endometrial biopsies and curettings were reviewed, with patient ages ranging from 18 to 70 years. The most common finding was normal cyclical endometrium, observed in 165 (40.94%) cases, followed by disordered proliferative endometrium in 54 (13.40%) cases, and hyperplasia in 44 (10.92%) cases. Malignancy was identified in 10 (2.48%) cases, with hyperplasia and malignancy being more prevalent in the perimenopausal and postmenopausal age groups. The study concluded that histopathological evaluation of endometrial biopsies and curettings reveals a broad range of conditions, from normal endometrium to malignancy. It emphasized that such evaluations are especially important in perimenopausal and postmenopausal women with AUB, to rule out preneoplastic or malignant conditions.

Bodal VK et al., (2014)[23] conducted a study to find the incidence of various pathological lesions of endometrium i.e. non-neoplastic as well as neoplastic and to correlate various clinical findings like age, chief

complaints, and duration of these complaints with histopathological features. The present study included 300 endometrial biopsies with clinical diagnosis of Dysfunctional uterine bleeding or infertility. The biopsies were processed and sections stained with H and E stain. Special stain (ZiehlNeelsen) was done wherever necessary. Primary infertility (75%) is more common than secondary infertility (25%). Most common presenting age group for DUB cases was 41-50 years (40.91%) and for infertile cases, 26-30 years (47.5%). The most common type of bleeding in DUB cases was menorrhagia (47.73%). Proliferative endometrium (30.45%) was the most common endometrial pattern in DUB cases and secretory endometrium (35%) in infertility cases. Benign neoplasms (endometrial polyp) constituted 3.64% of DUB cases and premalignant conditions (hyperplastic endometrium)-16.36% of DUB cases. Malignant neoplasms (endometrial carcinoma) were found in 3.64% of DUB cases, being most common in 6th decade of life (50%) and postmenopausal bleeding (62.5%) was the most common clinical presentation.

Patil P et al., (2014)[24] compared three methods of endometrial sampling – nasogastric tube aspiration cytology, Pipelle biopsy, and dilatation and curettage (D&C) – for diagnosing perimenopausal bleeding. The study, conducted at R.L. Jalappa Hospital from 2012 to 2013, involved 100 women with perimenopausal bleeding. Results

showed that aspiration cytology detected benign pathologies in 44% and premalignant lesions in 19%, while Pipelle biopsy detected benign lesions in 49% and premalignant ones in 45%. D&C identified benign pathology in 50% and premalignant lesions in 44%. Aspiration cytology had a higher rate of inadequate samples (37%) compared to Pipelle (4%) and D&C (4%). Pipelle biopsy had 100% sensitivity, 98.15% specificity, and 99% diagnostic accuracy, making it an ideal initial screening method due to its speed and ability to preserve tissue architecture.

Verma U et al., (2014)[25] studied the prevalence of abnormal uterine bleeding and its type in perimenopausal women as well as to compare diagnostic efficacy of ultrasonography, hysteroscopy and histopathology. Most of the patients were multiparous, more than 50% belong to socioeconomic class III and IV and mean age was 43.05 ± 4.09 years. Commonest complaint was menorrhagia (45%) followed by metrorrhagia in 19% and menometorrhagia in 14%. Majority of patients (85%) had uterine volume between 151 and 250 cm^3. Only three patients had uterine volume more than 252 cm^3. Endometrial hyperplasia was diagnosed in 14% with ultrasonography, 11% on hysteroscopy while in 15% on hystopathological examination. In perimenopausal women with AUB, ultrasonography should be first investigation because of its freely availability, noninvasiveness and cost effectiveness.

Cheheb N et al., (2016)[43] to evaluate female infertility using two complementary methods of exploration: hystero-laparoscopy and endometrial biopsy, to compare histopathological data with those of hystero-laparoscopy findings in the same patients, and finally assess the interest to couple both methods to detect a greater number of pathologies. The study included 64 patients aged 20-43 years with primary or secondary infertility for a period of 3 years ranging from 2012 to 2015 at obstetrics and gynecology department in which all pa tients were admitted to a hysteroscopy followed by laparoscopy. Endometrial biopsy curettage was performed and sent to the Pathological Anatomy Department for a histopathological study. On 64 infertile women explored, no pathologies were findings in 20 patients (31.3%) to the biopsy and 27 patients (42.2%) by hysteroscopy-laparoscopy. Histopathological study was in favor of dysfunctional endometrium (50%) followed by hyperplasia (10.9%). The lesions findings in the hystero-laparoscopy were in the first place uterine (18.8%) followed by equally between tubal and endometrial pathologies (10.9%). Associated diseases affecting the same organs or more were recorded with a percentage of 7.8%. The two methods have been shown effective and the most of common pathologies findings were uterine and endometrial. They concluded that the endometrial biopsy was more decisive in the

exploration of endometrium pathologies while hystero-laparoscopy is more sensitive for the exploration of uterine, tubal and ovarian pathologies.

Khan R et al., (2016)[27] did a study to evaluate DUB in various age groups, carry out histopathological study of the endometrium and analyze its clinic-pathological patterns. The study included 500 cases of atypical uterine bleeding, out of which 120 cases of DUB were included based on clinical features and detailed investigations. Hyperplasia was the commonest endometrial pathology (20.5%) followed by luteal phase insufficiency (15.6%) and secretory endometrium (13.7%). Endometritis including tubercular endometritis (12.7%), post abortal (5.8%), proliferative (6.8%), polyp (3.9%), atrophic (3.9%), exogenous hormone changes (2.9%) and anovulatory cycles (6.8%) made up for the remaining lesions. DUB occurs secondary to a wide variety of functional and structural abnormalities, warranting a thorough evaluation especially in perimenoupausal females. Menorrhagia is a common symptom and the most likely etiology relates to the patient's age.

Nepal N et al., (2016)[28] conducted a study to assess the histopathological patterns of endometrial biopsies in patients with dysfunctional uterine bleeding. This cross-sectional observational study took place at Nobel Medical College, Biratnagar, Nepal, over a three-year

period from June 2012 to June 2015. It included all patients with dysfunctional uterine bleeding who underwent endometrial biopsy. The study analyzed various histopathological patterns across different age groups. A total of 300 cases were included, with proliferative endometrium being the most common finding (61%). The most frequent pathology was simple cystic hyperplasia (13.3%), followed by secretory endometrium, chronic endometritis, and pill endometrium. Malignant lesions were found in 8 patients (2.7%), predominantly in those aged over 50, followed by those in the 41-50 age group. Atrophic endometrium was the most common finding in postmenopausal bleeding (3.6%), followed by endometrial carcinoma in 8 cases (2.7%). The study observed that the incidence of endometrial bleeding was highest in the perimenopausal age group. The authors concluded that dilatation and curettage is a valuable diagnostic tool for assessing dysfunctional uterine bleeding, evaluating therapeutic responses, and identifying organic lesions in affected women.

Talukdar B et al., (2016)[29] did a study among perimenopausal women who underwent hysterectomy for abnormal uterine bleeding (AUB). The clinical presentations, ultrasonographic findings, and histopathological reports of hysterectomy specimen were correlated. Among 103 number of hysterectomized cases for AUB, most of the patients were between 40 and 45 years of age (67.97%) and menorrhagia

was the dominant clinical presentation. 45.63% of cases were diagnosed as fibroid uterus by ultrasonography with 89.13% sensitivity and 89.47% specificity. Histopathological reports of myometrium showed 44.66% fibromyoma, followed by 34.95% of the normal myometrium. Histopathology of endometrium revealed hyperplasia in the most cases (56.31%) where simple typical type was the predominant. In conclusion, uterine fibroid was the leading cause of AUB and radiological, pathological evaluation correlated well to diagnose fibroid.

Tiwari A et al., (2016)[30] conducted a study to find out the histopathological pattern of endometrium in abnormal uterine bleeding (AUB) in the light of clinical details. Formalin fixed endometrial specimens were processed, paraffin embedded, sectioned at 3-4μm, stained with hematoxylin and eosin, and studied under light microscopy along with their demographics. The study included 100 cases of endometrial biopsy specimens with clinical diagnosis of AUB. Menstrual disturbances was found in wide age range between 17-75 years with the mean age of 45 (SD=13.36) years. Menorrhagia was the commonest (n=60, 60%) clinical presentation. Most (n=85; 85%) endometrium had non-neoplastic lesions. Among them, normal endometrial patterns were commonest (n=50, 50%). Neoplastic lesions (n=15, 15%) were

distributed in all menstruation status with majority in postmenopause (n=7, 7%) and included malignant cases (n=5, 5%) among others. They concluded that post-menopausal bleeding was common presentation among women with malignant and premalignant disease which was present in 15% of the cases together. Timely evaluation of AUB by histopathology can be life-saving with early tissue diagnosis and management.

Betha K et al., (2017)[31] conducted a study to categorize women with Abnormal Uterine Bleeding (AUB) according to PALM COEIN classification system and to correlate the clinical diagnosis and histopathologic features of various causes of AUB. A retrospective study was carried out on 250 non- gravid reproductive age women between 25-45 years with complaints of AUB at Mediciti Institute of Medical Sciences, a rural tertiary teaching hospital during the period January 2014 to December 2015. The PALM and COEIN groups accounted for 60.4% and 39.6% respectively. Leiomyoma was the most common cause of AUB (30.4%) and Ovulatory disorders was the 2nd most common cause of AUB (13.6%). A total of 172 (68.8%) were classified as having chronic AUB and 78 (31.2%) as having acute AUB. In AUB-L, the difference in clinical and histopathological diagnosis was significant (p=0.03). Structural causes of AUB contributed more to the cause of

AUB. The PALM COEIN classification system helps us in understanding various etiological causes of AUB and can be used by clinicians and researchers for international comparisons.

Inal ZO et al., (2017)[32] conducted a study to examine the relationship between clinical indications and histopathological findings in patients undergoing endometrial sampling. The study retrospectively analyzed data from 4,247 patients who underwent endometrial sampling for non-obstetric gynecological reasons at the Gynecology and Obstetrics Clinic of Konya Training and Research Hospital between January 2010 and October 2016. The average age of the patients was 46.8 ± 8.22 years, with menometrorrhagia/menorrhagia being the most common indication (70.66%) and cervical polyp the least common (1.34%). The most frequent histopathological finding was proliferative-secretory endometrium (63.62%), while the least common result was simple hyperplasia with atypia (0.56%). Endometrial cancer was more commonly observed in patients with post-menopausal bleeding and increased endometrial thickness (23.11%). Among those who underwent biopsies, 52.18% had previously undergone hysterectomy, with proliferative-secretory endometrium being the most common finding (59.52%) and simple hyperplasia with atypia the least. The study concluded that while endometrial sampling is necessary for patients with

post-menopausal bleeding or increased endometrial thickness, routine biopsy should not be recommended for other indications.

Prasad A and Kumar A (2017)[33] conducted a study to evaluate the accuracy of diagnostic hysteroscopy in assessing abnormal uterine bleeding (AUB) and to compare its findings with histopathology reports. The study included 120 patients, aged 20–60, with a history of AUB. Hysteroscopy was performed post-menstrually in most cases, except for those with irregular cycles or continuous vaginal bleeding. Following hysteroscopy, patients underwent dilatation and curettage (D&C), with endometrial samples sent for histopathological analysis. AUB was most common in women aged 32-40 years, with menorrhagia being the primary complaint. Hysteroscopy revealed abnormalities in 55% of patients, including endometrial hyperplasia (24%), polyps, submucous myomas, endometrial atrophy, carcinoma, misplaced IUDs, synechiae, and tubercular endometritis. While both hysteroscopy and D&C were accurate in detecting abnormalities, hysteroscopy provided more detailed information and was better at identifying lesions. In conclusion, hysteroscopy offers a more accurate and comprehensive diagnosis of AUB than D&C alone.

Rizvi SA et al. (2017)[34] investigated the clinicopathological spectrum of endometrial findings in women with abnormal uterine

bleeding (AUB). The study included 370 cases, with histopathological examination of dilatation and curettage (D&C) samples used to identify the underlying cause of AUB. The patients were categorized into premenopausal, perimenopausal, and postmenopausal age groups. Of the cases, 240 (64.8%) were premenopausal, 93 (25.1%) were perimenopausal, and 37 (10%) were postmenopausal. In the premenopausal group, the most common finding was proliferative endometrium (48%), followed by secretory endometrium (31%). In the perimenopausal group, simple hyperplasia was the most frequent (41%), followed by proliferative (29%) and secretory endometrium (17%). In the postmenopausal group, complex hyperplasia was the most common pathology (33.3%), followed by atrophic endometrium (27%). The study concluded that histopathological examination is crucial in diagnosing the causes of AUB and plays a key role in the early detection of premalignant and malignant endometrial lesions, which have a better prognosis when identified early.

Ahmed M et al., (2018)[35] did a study to find out the morphological pattern of endometrium in infertile women in a tertiary care hospital to find out the causes of infertility and subsequent treatment of the patients. The study included 196 referred cases endometrial curettage or biopsy samples of infertile women, collected between days 21 to 23 of menstrual

cycle. The than infertility were excluded from the study. Hematoxylin and Eosin (H&E) stained histopathological slides were prepared from the samples and examined under microscope. Reported results and relevant data were recorded in SPSS data collection sheet and statistical analysis was carried out. A total of 196 cases of endometrial biopsy or curettage samples of both primary and secondary infertile women were studied. Age ranged from 20 years to 40 years with a mean age of 29.91±4.32 years. 70.92% cases presented with primary infertility and 29.08% cases presented with secondary infertility. Proliferative phase/anovulation (41.33%) was found as the most common morphological pattern of endometrium in infertile women followed by secretory phase (40.30%). Endometrial hyperplasia, inadequate sample, endometrial samples obtained from patients suffering from diseases other nonspecific ednometritis and tuberculous endometritis were found in 10.72%, 6.12%, 6.12% and 0.51% cases respectively. In primary infertility, proliferative phase / anovulation (43.17%) was also the predominant pattern followed by secretory phase (37.40%) and endometrial hyperplasia (11.52%). Whereas, secretory phase (47.37%) was the most common pattern of endometrium in secondary infertility, followed by proliferative phase (36.37%) and endometrial hyperplasia (8.77%). Primary infertility was most frequently presented in 26-30 years of age, whereas, secondary

infertility was more prevalent in later age group. Histopathological study of endometrium gives us valuable information of endometrium in infertility. Morphological pattern of endometrium in our study was quite similar to other studies conducted in different countries with some variations.

Prasannalakshmi S and Krishnaveni VS (2018)[36] conducted a study to examine the histological patterns of endometrial findings in women with abnormal uterine bleeding (AUB). Histopathological analysis is crucial for the diagnosis and management of AUB. This retrospective study was carried out on endometrial samples collected from patients at the Department of Obstetrics and Gynecology, Mahatma Gandhi Memorial Government Hospital, Trichy, over a one-year period from November 2017 to October 2018. The study included women attending the gynecology outpatient department (OPD) and those admitted to the gynecology ward with complaints of AUB. The most common finding was a normal cyclical endometrium, followed by proliferative endometrium in 56% of cases and secretory endometrium in 33% of cases. The highest number of AUB cases occurred in women aged 41–50 years (48% of cases). Endometrial carcinoma was most commonly found in women aged 50–60 years (6 cases). The study concluded that histopathological examination is the gold standard for diagnosing AUB,

and benign conditions can often be managed with hormonal therapy or conservative surgical options, reducing the need for hysterectomy.

Bhagat R et al., (2019)[37] highlighted that abnormal uterine bleeding can be caused by a range of conditions, making it one of the most common reasons for endometrial sampling. While it can sometimes reflect a normal physiological process that requires only observation, in other cases, it may indicate a serious underlying issue that demands prompt treatment. The study, conducted at the histopathology section of the Department of Pathology, GMC Jammu, included all endometrial curettings and biopsy specimens received during the study period, with patient ages ranging from 14 to 75 years. The largest number of cases (40.43%) was found in the 31-40 age group. The most frequent histopathological findings were secretory endometrium (170 cases), followed by proliferative endometrium (99 cases), endometrial hyperplasia (42 cases), and products of conception (27 cases). Additionally, 6 cases of endometrial carcinoma and 4 cases of squamous cell carcinoma were identified. The study emphasized that histopathological examination of endometrial tissue in patients with abnormal uterine bleeding reveals a broad range of changes, from normal cyclical endometrium to malignancies, underscoring its critical role in diagnosing AUB.

Sujatha R and Pratyusha.,(2019)[38] conducted a two-year retrospective study at a hospital in Visakhapatnam on women with abnormal uterine bleeding (AUB) unresponsive to medical treatment and not linked to structural issues. A total of 360 women were included, categorized into three age groups: 20-40 years (reproductive), 41-50 years (perimenopausal), and >50 years (postmenopausal). Endometrial samples were examined microscopically. Histopathological findings showed proliferative endometrium in over 50% of cases, secretory endometrium in 25%, and atrophic endometrium in 10.3%. Other findings included cystic dilation (1.7%), hyperplasia (1.1%), and endometrial malignancy (0.5%). Proliferative endometrium was seen across all age groups, with secretory endometrium common in younger and perimenopausal women, and atrophic endometrium more frequent in postmenopausal women.

Vani B et al., (2019)[39] to evaluate histopathology of endometrium and observe the incidence of various endometrial pathology patterns in different age groups presenting with abnormal uterine bleeding. The most common pattern observed was normal cycling endometrium (56.27%). The other morphological patterns were endometrial hyperplasia (19.48%), disordered proliferative pattern (5.62%), complications of pregnancy (4.76%), benign endometrial polyp (2.6%), chronic endometritis (2.16%)

and carcinoma (0.86%). The most common age group presenting with AUB was 40-49 years (47.18%) followed by 30-39years (33.76%). Endometrial causes of AUB and age distribution was statistically significant with P value <0.05. There is an age specific association of endometrial lesions. Atrophy and carcinoma endometrium are predominant in peri-menopausal and post-menopausal age. Endometrial curetting's and biopsy proved to be an important diagnostic procedure for assessment and subsequent management of abnormal uterine bleeding.

Roy M et al., (2020)[40] conducted a hospital-based cross-sectional study involving fifty patients aged 45 to 60 years, who presented with perimenopausal bleeding at the inpatient and outpatient departments of Sir Salimullah Medical College and Mitford Hospital, Dhaka. Patients were selected based on specific inclusion and exclusion criteria. Routine investigations, including pelvic ultrasound, were performed, and endometrial biopsy was obtained through diagnostic D&C. The data were analyzed using the Chi-square test and the Statistical Package for Social Sciences (SPSS, version 16.0). The most common histopathological findings were endometrial hyperplasia (32%) and polyps (24%). Other findings included proliferative endometrium (16%), secretory endometrium (12%), endometrial carcinoma (6%), endometritis (4%), and atrophic endometrium (6%). The study concluded that endometrial

biopsy is a crucial procedure for all cases of perimenopausal and postmenopausal abnormal uterine bleeding to exclude malignancy.

Samal R et al., (2020)[41] conducted a study to examine the clinical and pathological spectrum of abnormal uterine bleeding (AUB) and associated endometrial lesions in patients at a tertiary care hospital in southeastern India. The study included 153 cases over a two-year period, where patients with AUB were evaluated through dilatation and curettage (D&C), and the endometrial samples were histopathologically analyzed. The majority of the cases (93) were non-neoplastic, followed by neoplastic lesions (60). In the reproductive age group, proliferative and secretory endometrium were the most common findings, while malignancies, particularly type I adenocarcinoma, were more frequently observed in postmenopausal women. The study highlighted that the incidence of AUB was higher than expected in the population, and emphasized that histopathological evaluation of endometrial biopsies plays a crucial role in diagnosing AUB and identifying the underlying causes.

Sunitha MM (2020)[42] conducted a study to compare the effectiveness of office endometrial biopsy with dilatation and curettage (D&C) in terms of sample adequacy and diagnostic accuracy. This prospective study was carried out at a tertiary care center over a two-year

period, involving 150 women with abnormal uterine bleeding. The patients were randomly divided into two groups: Group A (n=75) underwent D&C under anesthesia, while Group B (n=75) received Pipelle endometrial sampling. Detailed clinical histories, examination findings, and ultrasound reports (including pelvic pathology and endometrial thickness) were recorded. Histopathology reports were analyzed for sample adequacy and diagnostic patterns, and patients were followed up for up to two years. For those who later underwent hysterectomy, the endometrial pathology in the hysterectomy specimen was used as the gold standard for comparison. The sample adequacy rate was 93% for D&C and 92% for Pipelle biopsy. Both methods mostly had inadequate specimens when focal lesions were present. The diagnostic accuracy for detecting atypical hyperplasia and adenocarcinoma was 97.6% for D&C and 95.7% for Pipelle biopsy. Both procedures missed focal lesions, and 33.3% of atypical hyperplasia cases diagnosed by either method had coexisting adenocarcinoma in the hysterectomy specimen. The study concluded that Pipelle biopsy is a cost-effective method for endometrial sampling compared to D&C.

Das S and Mondal R (2021)[43] conducted a study to identify common uterine abnormalities and assess the accuracy and agreement between hysteroscopy findings and histopathological results. This

observational study involved 150 women with a history of abnormal uterine bleeding lasting more than six months, who underwent hysteroscopy-guided endometrial tissue sampling for histopathological diagnosis. The findings from hysteroscopy were compared with histopathological results using measures such as sensitivity, specificity, positive and negative predictive values, and kappa statistics. The average age of participants was 39.68±6.19 years, with menorrhagia (33.3%) being the most common symptom and proliferative endometrium (25.3%) the most common histopathological finding. The most frequent endometrial thickness (68.67%) observed by transvaginal sonography was between 5-10 mm. Hysteroscopy demonstrated 96% sensitivity, 53.8% specificity, 90.9% positive predictive value, and 77.8% negative predictive value for detecting abnormal pathology compared to histopathology. The results indicated that hysteroscopy provides a more accurate sample for histopathological examination than dilatation and curettage, which is a blind procedure. This improved diagnostic accuracy helps in better treatment planning and may reduce unnecessary hysterectomies.

Gaikwad S et al., (2021)[44] analyzed 400 endometrial curettage samples clinicopathologically at a rural tertiary care center. The samples were processed using H&E staining, with special staining and immune-

histochemistry (IHC) performed when necessary. A clinicopathological correlation was made for all cases, and the results were compared with other studies. The age range of the patients in the study was from 18 to 70 years, with the most common age group being 31–40 years. The most frequent findings were cyclical changes in the endometrium, followed by abnormal endometrial pathologies and trophoblastic diseases. The study concluded that endometrial biopsy is a crucial diagnostic tool for gynecological conditions. Understanding the histological patterns of the endometrium in abnormal uterine bleeding across different age groups is essential for appropriate case management. Additionally, postmenopausal bleeding should always be regarded as a potential sign of malignancy until proven otherwise.

Kinake M et al., (2021)[45] conducted a study to examine the histopathological patterns of endometrial tissue in patients with abnormal uterine bleeding (AUB). The study included all patients attending the Gynaecology outpatient department with AUB, and the samples analyzed were from Dilatation and Curettage (D&C), endometrial biopsies, polypectomies, and hysterectomy specimens. A total of 680 cases were studied, with 661 providing significant findings and 19 cases deemed unsatisfactory for evaluation. The most common histological pattern was proliferative endometrium, found in 248 (36.47%) cases, followed by

leiomyoma in 100 (14.70%), adenomyosis in 90 (13.23%), and endometrial hyperplasia in 72 (10.58%). Other findings included secretory endometrium (6.91%), atrophic endometrium (6.91%), endometritis (1.61%), endometrial polyp (3.97%), and adenomyosis with leiomyoma (3.66%). Endometrial carcinoma was found in just 3 (0.44%) cases. The study highlighted that AUB is most common in the peri-menopausal period, particularly in the fourth and fifth decades of life, with menorrhagia being the most frequent clinical symptom. The most common histopathological finding was proliferative endometrium, which suggests anovulation. Overall, the study emphasized that histopatho-logical examination of endometrial samples plays a crucial role in diagnosing and managing AUB, revealing a wide range of conditions from normal endometrium to malignancy.

Manjari and Kumar (2021)[46] conducted a retrospective study of endometrial biopsies over a period of 1.5 years. After processing and staining the tissue slides with hematoxylin and eosin, they were microscopically examined. A statistical analysis using the Chi-square test was performed to assess the relationship between endometrial histopathology and the mean age of presentation. A total of 197 samples were included after exclusions, with endometrial hyperplasia being the most common finding, accounting for 29.4%, primarily in the

reproductive age group. Other findings included proliferative endometrium (20.3%), atrophic endometrium (16.24%), chronic endometritis (9.64%), endometrial polyps (8.63%), disordered proliferative endometrium (7.61%), and secretory endometrium (6.6%). Endometrial carcinoma was rare, diagnosed in just 1.52% of cases, mostly in postmenopausal women. Menorrhagia was the most common symptom, reported by 48.2% of patients. The study concluded that while D&C is a useful method, newer techniques may offer better diagnostic capabilities, and emphasized the importance of avoiding unplanned hormone therapy to prevent endometrial hyperplasia.

Nagose VB et al., (2021)[47] investigated the various endometrial histological patterns in women with abnormal uterine bleeding (AUB) due to endometrial causes, along with the distribution of age groups and endometrial thickness (ET) in these cases. This retrospective study included endometrial samples from AUB patients with endometrial causes, collected over a three-year period in the Department of Pathology at a medical college and hospital. Clinical histories, examinations, and ET measurements were recorded. The samples were processed and stained with hematoxylin and eosin for histopathological analysis. A total of 475 cases were included, consisting of 176 endometrial biopsies and D&C materials (37.05%) and 299 hysterectomy specimens (62.95%). The most

common histological pattern was normal cyclic endometrium, followed by atrophic endometrium, pill-induced endometrium, and hyperplasia without atypia. Endometrial carcinoma (1.47%) was most commonly observed in the 40-49 and 50-59 age groups, with all cases having an endometrial thickness of ≥10 mm. Endometrial hyperplasia with atypia (or endometrial intraepithelial neoplasia, EIN) was seen in women over 30 years old, with the majority having endometrial thickness ≥10 mm, followed by those with thickness between 8.1–10 mm. The study concluded that endometrial biopsy is crucial for accurately diagnosing the cause of AUB in women of all age groups, with malignant and premalignant lesions more commonly observed in the peri- and post-menopausal years, particularly with an endometrial thickness of ≥10 mm.

Ranjan S et al., (2021)[48] conducted a study on women with abnormal uterine bleeding (AUB) to evaluate the histopathological patterns in endometrial biopsy among different age groups. The clinical history and findings of 100 patients were collected and recorded. Histopathological study of endometrial patterns and age specific correlation was done. Out of a total of 100 patients of AUB, 72 of them had a functional cause and the remaining 28 patients revealed an organic cause. The mean affected age was 40 years with youngest being 21 years old and the oldest patient was 57 years of age. Functional causes

constituted 72% and organic lesions were seen in 28% out of which Proliferative phase endometrium was the most common functional lesion observed while endometrial hyperplasia was the commonest organic pathology seen. P value was calculated as <0.008 which was significant using chi square for trend seen in age. Histopathological examination of endometrial biopsy in patients of AUB is considered as a gold standard of patient evaluation, diagnosis and management and avoids any future complications.

Sufia H et al. (2021)[49] conducted a study to analyze and age-stratify the types and frequencies of endometrial pathologies in Saudi women with abnormal uterine bleeding (AUB) who underwent endometrial biopsies at King Saud University Medical City in Riyadh over a 13-year period. This retrospective study, conducted from 2006 to 2018, reviewed 6458 biopsies from Saudi women with AUB. The women were categorized into three age groups: <40, 40-55, and >55 years. In the <40 and 40-55 age groups, the most common findings were cyclical endometrium, followed by endometrial polyps and disordered proliferative endometrium. In the >55 age group, atrophic endometrium was the most frequent finding, followed by endometrial polyps. Hyperplasias and malignancies accounted for 7.2% of the cases, with the majority in the >55 age group. Simple hyperplasia without atypia was the

most common (3.9%), followed by malignancies (1.9%), complex atypical hyperplasia (0.7%), complex hyperplasia without atypia (0.4%), and simple atypical hyperplasia (0.3%). The study highlighted the importance of being aware of the potential range of endometrial pathologies across different age groups to guide clinical management. It emphasized that endometrial biopsies are crucial for the early detection of precancerous and cancerous lesions, particularly in women over 40.

Alshdaifat EH et al., (2022)[50] examined the histopathological patterns of endometrial biopsies in patients with abnormal uterine bleeding (AUB) who underwent dilation and curettage (D&C), analyzing the results across different age and parity groups. The study also investigated the discrepancies between D&C findings and histopathological results from hysterectomy specimens. A total of 3,233 patients were included, with the majority in the 18-39 age group, where normal cyclical endometrium was the most common histopathological finding. Malignant lesions were seen in 42 patients, most of whom were over 50 years old. In 13.3% (42/316) of cases, D&C failed to identify intrauterine abnormalities that were later detected in hysterectomy specimens. The overall accuracy of D&C in distinguishing normal from pathological findings was 75.60%, with a sensitivity of 72.90%, specificity of 77.90%, positive predictive value of 73.86%, and negative

predictive value of 77.05%. While normal cyclical changes were the most frequent histopathological findings, hyperplasia and malignancies were significant causes of bleeding in perimenopausal and postmenopausal women. Despite some concerns over D&C's role as a sampling method for AUB, it remains highly effective in diagnosing premalignant and malignant conditions.

Somasundar BSM et al., (2022)[51] did a study to compare the efficacy of plain cervical dilatation and curettage (D&C) and hysteroscopic-guided biopsy in evaluating endometrial pathology and to compare the histopathology findings of hysterectomy specimen. A total of 100 uterine bleeding in gynecology OPD were included. Those women who are eligible for diagnostic D&C, cervical dilatation and endometrial curettage were done under i.v. sedation in the operation theater (OT) and the curetting was sent for histopathological examination (HPE). Those women who need hysteroscopy, it was done under short general anesthesia and the sample was sent for histopathologic examination. Patients for whom hysterectomy was indicated following D&C or hysteroscopy would be followed for the histopathological findings. The cases range in the age - group of 40–55 years who presented with abnormal uterine bleeding (AUB) without local gynecological cause and with failure of medical treatment for at least 3

months. The mean duration between the endometrial curettage and the hysterectomy being 2.5 weeks. The highest correlation was seen in the perimenopausal and postmenopausal women complaining of abnormal endometrial phase, followed by complex and then by simple hyperplasia. In conclusion, D&C and hysteroscopy are the two most important diagnostic modalities in perimenopausal and postmenopausal bleeding. Patients for whom ultrasonography showed focal endometrial lesions need further evaluation and hysteroscopy.

Karim Z et al., (2022)[52] conducted a study to examine the prevalence of various endometrial histological patterns in women with abnormal uterine bleeding (AUB) and to investigate the underlying causes of AUB and their management. The study was conducted on 300 patients. Histological analysis of endometrial samples revealed that the majority of patients with AUB were between the ages of 41 and 50 (48.6%), with most being multiparous. The most common symptoms were menorrhagia (42%), followed by polymenorrhagia (15%), menometrorrhagia (10.6%), persistent vaginal bleeding (9.6%), and postmenopausal bleeding (8.6%). The most frequent histological findings were proliferative endometrium (37%) and secretory endometrium (30%), while endometrial hyperplasia was found in 22.6% of cases. The study emphasized the importance of endometrial evaluation in ruling out

premalignant conditions and cancers, particularly in perimenopausal and postmenopausal women.

Tilva KK et al., (2022)[53] to evaluate the spectrum of endometrial histology in cases of AUB, to find out age wise incidence of AUB, and to find out age wise incidence of various histological pattern of endometrium in AUB. 110 women with a complaint of AUB attending the gynecology outpatient department (OPD) at tertiary care hospital, Rajkot, Gujarat during one year (August 2020 to July 2021). Maximum number of cases of AUB were noted in the age group of (31-40) years (44 cases, 40%). Most common observed histopathological pattern in this study was normal cyclical patterns including proliferative endometrium (34.5%) and secretory endometrium (21%). Histopathological evaluation of endometrium is indicated in women over the age of 35 years presenting with AUB to rule out preneoplastic lesions and malignancies.

Vijayaraghavan Sr A et al., (2022)[54] conducted a study to examine the histopathological patterns of endometrium in women with abnormal uterine bleeding (AUB) and identify the predominant patterns across different age groups. The study, which took place at the Indira Gandhi Medical College and Research Institute in Puducherry from January 2019 to December 2020, included endometrial biopsies from patients with AUB, excluding gestational causes. Of the 160 cases

analyzed, most biopsies came from women aged 41-50, with menorrhagia being the most common complaint. The bleeding patterns were significantly associated with age groups (p=0.00). Of the 160 cases, 104 were related to functional causes, with no significant age-related differences in functional or organic causes (p=0.67 and p=0.99, respectively). The most common histological patterns were the normal cyclical phases, with proliferative (56 cases) and secretory (30 cases) phases observed in 86 cases. Endometrial hyperplasia was found in 42 cases, 9 of which had atypical hyperplasia, while endometrial polyps were also commonly seen. Only two cases of endometrial carcinoma were reported. Although normal cyclical patterns were most common, endometrial sampling should be considered more frequently in peri- and post-menopausal women, where the incidence of hyperplasia and carcinoma is higher.

Bindhuja J (2023)[55] conducted a study to examine the histopathology of the endometrium and identify the causes of abnormal uterine bleeding. Endometrial samples were collected through dilation and curettage from 50 women with abnormal uterine bleeding, who presented to the gynecology outpatient department at a medical college hospital. Of the 50 cases, 21 (72.4%) were diagnosed with endometrial hyperplasia, and 24 (48%) had an organic lesion. Most cases showed a

proliferative phase endometrium (40%). The most affected age group was 31-40 years, with simple cystic hyperplasia being the most common endometrial pattern. Single-parity women typically exhibited a secretory endometrium. The study concluded that endometrial sampling is essential for all patients with abnormal uterine bleeding to investigate the histopathology and underlying causes.

Dubey A et al., (2023)[56] conducted a prospective cross-sectional study to identify the endometrial causes of abnormal uterine bleeding (AUB) across different age groups. The study, which included 200 patients from January to October 2023 at a teaching hospital, analyzed endometrial biopsies, curettages, and hysterectomy specimens from women with AUB. The patients' ages ranged from 17 to 71 years. Among the 200 cases, 45% were in the perimenopausal group, 34% in the reproductive age group, and 21% in the postmenopausal group. Menorrhagia was the most common bleeding pattern, seen in 54% of patients. Hormonal imbalance was found in 28% of reproductive-age women, and atrophic endometrium was noted in 7.5% of postmenopausal women. Chronic endometritis was observed in 3% of reproductive-age women. The study highlights the variability of endometrial patterns in AUB across different age groups and underscores the importance of

histopathological examination for early detection of precancerous lesions and malignancy.

Vitale SG et al., (2023)[57] updated guidelines for endometrial biopsy (EB) in gynecological practice. An adequate tissue sample is essential, and blind methods are not recommended for suspected endometrial malignancy. Hysteroscopy offers the highest diagnostic accuracy and cost-effectiveness, while blind suction techniques are unreliable for diagnosing endometrial polyps. In resource-limited settings, blind methods may be used when hysteroscopy is not available. Grasp biopsy is preferred for reproductive-age women, while bipolar electrode biopsy is better for atrophic endometrium. EB is necessary for diagnosing chronic endometritis, and there is no consensus on the endometrial thickness threshold for recommending EB in asymptomatic postmenopausal women. EB should be considered for young women with abnormal bleeding and endometrial cancer risk factors. Hysteroscopy with EB is useful even without sonographic abnormalities. In postmenopausal women with bleeding or those on tamoxifen with endometrial thickness >4 mm, EB is recommended.

Pathak M et al., (2023)[58] conducted a study to examine the histopathological patterns of endometrial samples in women with abnormal uterine bleeding (AUB) across different age groups. The study,

conducted between January 2018 and November 2020, involved the retrospective analysis of endometrial biopsy specimens, including curettings and hysterectomy samples, in the Department of Histopathology. A total of 280 cases were reviewed, with normal cycling endometrium found in 121 cases (43%). The most common pathology across all age groups was disordered proliferative endometrium, seen in 67 cases (24%). Other findings included atrophic endometrium (12%), complications of pregnancy and hormonal changes (2%), benign endometrial polyps (2%), adenomysis (1%), endometrial hyperplasia (12%), carcinoma (3%), and chronic endometritis (1%). The majority of patients with AUB were in the 40-49 year age group (46%). The study concluded that endometrial sampling is crucial for managing AUB, particularly in peri- and post-menopausal women, where conditions like atrophy and endometrial carcinoma are more common. A thorough histopathological examination and clinical correlation are essential in these cases.

Karimi M et al., (2024)[59] investigated the clinicopathological patterns of endometrial specimens in women with abnormal uterine bleeding (AUB) and their correlation with ultrasonographic findings. The study included 411 patients who presented with AUB at Shahid

Mohammadi Hospital between 2021 and 2023. Patients were categorized into three groups based on age and menstrual status: premenopausal (18-39 years), perimenopausal (40-49 years), and postmenopausal (≥50 years). The results were analyzed and correlated with patient age and other clinical data using statistical methods. Among the 411 cases, the youngest patient was 21 years old and the oldest was 77 years old. Menorrhagia was the most frequent complaint, reported by 48.0% (201) of the patients. The most common pathology across all age groups was endometrial polyp, found in 24.3% (100) of cases, followed by hormonal changes in 17.0% (70) of cases. Statistical analysis using chi-square showed a significant age-related trend (p=0.003). The study concluded that endometrial sampling is a valuable tool in diagnosing the causes of AUB, and that transvaginal sonography is highly sensitive in detecting endometrial polyps.

Narwade SB et al., (2024)[60] aimed to conduct a clinicopathological analysis of a large set of endometrial curettage samples in a tertiary care setting. The study examined 400 endometrial curettage specimens using Hematoxylin and Eosin (H&E) staining, with additional special stains and immunohistochemistry (IHC) applied when needed. A detailed clinicopathological comparison was made for each case, and the findings were compared to previous studies. The

participants' ages ranged from 18 to 70 years, with the majority falling between 31 and 40 years. The most common findings included cyclical endometrial changes, followed by various endometrial pathologies and trophoblastic diseases. The study highlighted the importance of endometrial biopsy as a key diagnostic tool for gynecological conditions, emphasizing the need to understand the histopathological patterns of endometrial changes in abnormal uterine bleeding (AUB) for better patient management. Postmenopausal bleeding should be considered suspicious for malignancy until proven otherwise.

AIMS AND OBJECTIVES

- To identify the various histopathological patterns in the endometrial biopsies and curetting in the patients of AUB.
- To see the correlation of the endometrial Biopsies and curetting in AUB with the radiological findings (if any) in these patients.

MATERIAL AND METHODS

The present observational study (retrospective, prospective) study will be conducted in Department of Pathology, SKIMS Medical College, Bemina Srinagar, after obtaining clearance from the Institutional Ethical Committee. Retrospectively (February 2022 February 2023) data was be obtained from the MRD section or archives of the Department of Pathology while as prospective study was be done with effect from (March 2023 – March 2025).

Study will be done on dilatation and curettage material obtained from women with a complaint of AUB attending the Department of Obstetrics and Gynaecology, SKIMS Srinagar.

Inclusion criteria

- Endometrial biopsies and curettings from the patients presenting with AUB irrespective of age group (excluding unmarried girls)

Exclusion criteria

- Patient presented with unsatisfactory samples like only blood clots and fibrin and no endometrial glands/stroma.
- AUB due to gestational causes like tubal pregnancy, molar pregnancy and abortion.

- Patients on hormone therapy within the last 6 month.
- Cervical pathology e.g. cervical cancer.

METHODOLOGY

Endometrial curettings are obtained by dilatation and curettage under sedation. All specimens will be sent for histology fixed in 10% neutral buffered formalin and submitted to routine tissue processing and paraffin embedding.

Adequacy Criteria:

Endometrial specimens are now taken at outpatients by pipelle or other techniques, with the result that many biopsy specimens contain scant, or even no, endometrial tissue. Paradoxically, superficial endometrial biopsy specimens with scant tissue often take longer to assess than intact biopsy specimens with an appreciable amount of tissue. It has been shown that in a postmenopausal woman with an atrophic endometrium and no focal lesion on ultrasound scan, the presence of scant endometrial tissue in biopsies from outpatients is the norm and there is little chance of missing relevant pathology. Furthermore, the classification of a biopsy specimen as inadequate may have medicolegal and clinical implications. For example, some clinicians routinely conduct

a repeat biopsy when an endometrial specimen has been classified as inadequate. It is my policy in reporting endometrial specimens that a biopsy specimen (from either outpatient clinic or curettage) is classified as inadequate only if no endometrial tissue is present. If there is any endometrial tissue, no matter how little, I do not categorise the specimen as inadequate. Instead, I use the term "unassessable" for those biopsies where minimal endometrial tissue is present and state that, although there is no hyperplasia, malignancy or any other specific diagnostic lesion, the tissue cannot be assessed. The presence of even a minimal amount of endometrial tissue provides presumptive evidence that the endometrial cavity has been entered, although theoretically endometrial-type glands with or without stroma can be derived from tuboendometrial metaplasia or endometriosis within the cervix. If intact tissue, comprising glands and stroma, is present then this can be typed, although with a comment that only a limited amount of tissue is available for examination

Sections of 5 μ thickness will be made slides will be stained by hematoxylin-eosin (H&E) and examined under light microscope. Recent World Health Organization (WHO) classification of tumors of female reproductive organs will be used for reporting of endometrial curettage.

Relevant clinical data including age, complain of patients, obstetric history, menstrual history, drug history and clinical diagnosis will be taken from histopathological requisition form. Histopathological diagnosis related record will be obtained from histopathological reports.

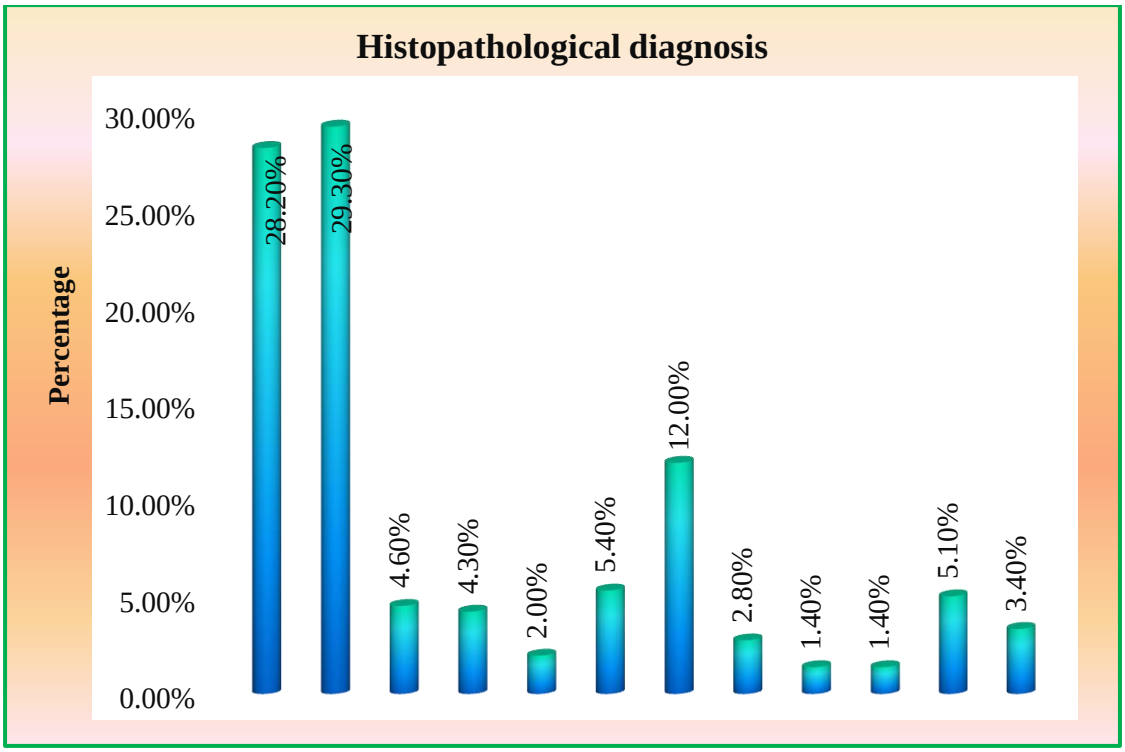
STATISTICAL METHODS

Data obtained will be saved in Microsoft Excel Spreadsheet and will be analysed using Statistical Package for Social Sciences (SPSS Ver. 23). Appropriate statistical tests will be applied to obtain the statistical analysis of the data. A p value of <0.5 will be considered as statistically significant.

RESULTS AND OBSERVATIONS

This study presents the findings of the study based on histopathological evaluation of endometrial samples collected from 351 patients presenting with abnormal uterine bleeding (AUB). The results are categorized into descriptive analysis and correlation (inferential) statistics.

Table 1: Histopathological diagnosis		
	No. of Cases	**Percentage**
Proliferative Phase	99	28.2%
Secretory Phase	103	29.3%
Disordered Proliferative endometrium	16	4.6%
Pill endometrium	15	4.3%
Chronic endrometritis	7	2.0%
Endometrial Polyp	19	5.4%
Endometrial hyperplasia without atypia	42	12.0%
Endometrial hyperplasia with atypia	10	2.8%
Endometrial Carcinoma	5	1.4%
Bleeding endometrium	5	1.4%
No opinion	18	5.1%
Pseudodecidual changes	12	3.4%



In this study, the most common histopathological patterns observed among patients with abnormal uterine bleeding were the secretory phase endometrium (29.3%) and proliferative phase endometrium (28.2%), reflecting normal cyclical endometrial changes. Endometrial hyperplasia without atypia was noted in 12% of cases, suggesting a significant prevalence of hormonal imbalance, while hyperplasia with atypia and endometrial carcinoma accounted for 2.8% and 1.4% respectively, indicating a smaller but clinically important group at risk for malignancy. Other notable findings included disordered proliferative endometrium (4.6%), pill endometrium (4.3%), endometrial polyp (5.4%), and chronic endometritis (2%). A minor percentage of cases (5.1%) had no definitive opinion, possibly due to sample inadequacy, and pseudodecidual changes were seen in 3.4%. These results highlight the spectrum of endometrial pathologies encountered in AUB and emphasize the importance of histopathological evaluation for accurate diagnosis and management.

Table 2: Age distribution		
Age in year	**No. of Cases**	**Percentage**
20 - 30	74	21.1%
31 - 40	167	47.6%
41 - 50	87	24.8%
51 - 60	15	4.3%
>60	8	2.3%

The majority of patients presenting with abnormal uterine bleeding in this study were in the 31–40 years age group (47.6%), followed by those aged 41–50 years (24.8%) and 20–30 years (21.1%), indicating that AUB is most prevalent in women of reproductive and perimenopausal age. A smaller proportion of cases were observed in the postmenopausal age groups, with 4.3% in the 51–60 years range and 2.3% above 60 years, highlighting that while AUB is less common in older women, it still requires careful evaluation due to the potential risk of premalignant or malignant lesions.

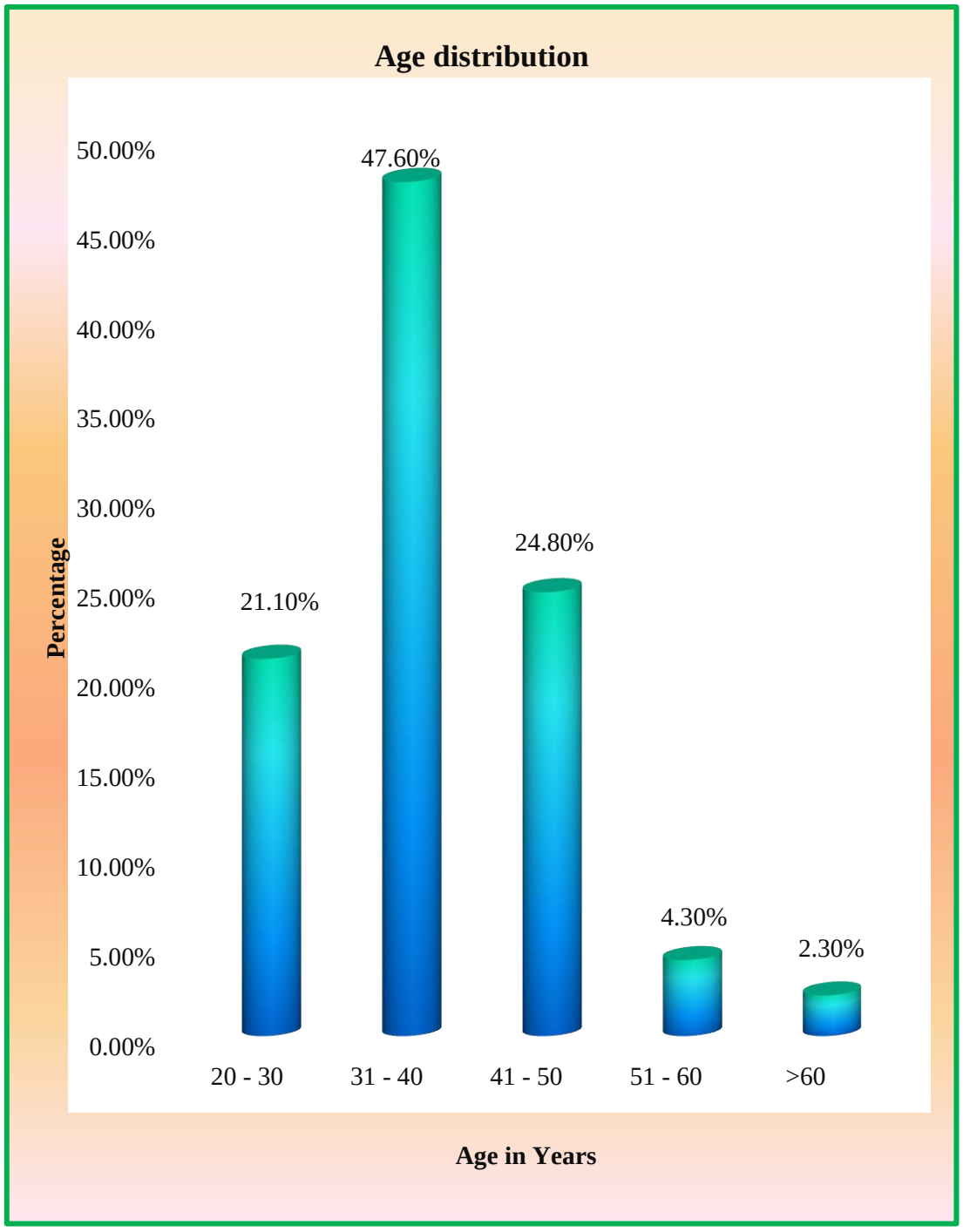

Age distribution
50.00%
45.00%
40.00%
35.00%
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
Percentage
21.10%
47.60%
24.80%
4.30%
2.30%
20 - 30
31 - 40
41 - 50
51 - 60
>60
Age in Years

Table 3: Presenting complaints		
	No. of Cases	**Percentage**
Menorrhagia	142	40.5%
Metrorrhagia	66	18.8%
Polymenorrhea	28	8.0%
Metro-menorrhea	18	5.1%
Post-menopausal bleeding	30	8.5%
Post cortal bleeding	6	1.7%
Polymenorrhagia	13	3.7%
Oligomenorrhea	32	9.1%
Dysmenorrhoea	16	4.6%

In this study, the most common clinical complaint among patients with abnormal uterine bleeding was menorrhagia (40.5%), followed by metrorrhagia (18.8%) and oligomenorrhea (9.1%), indicating that excessive or irregular bleeding patterns are the predominant concerns prompting medical evaluation. Other reported symptoms included polymenorrhea (8%), postmenopausal bleeding (8.5%), metro-menorrhagia (5.1%), and dysmenorrhea (4.6%). Less frequent complaints were polymenorrhagia (3.7%) and post-coital bleeding (1.7%). These findings reflect the wide spectrum of bleeding abnormalities associated with endometrial pathology and underscore the need for individualized diagnostic approaches.

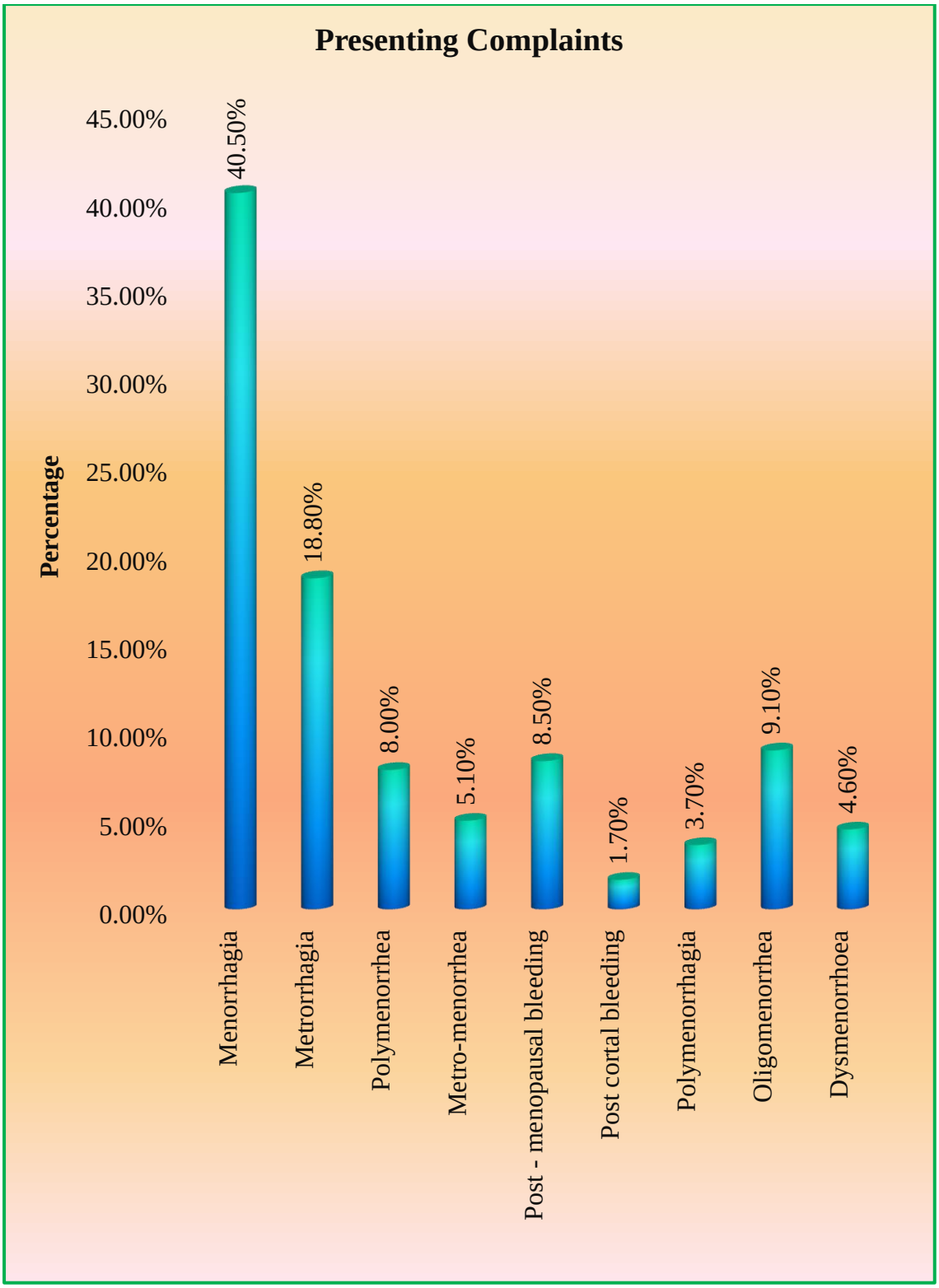

Presenting Complaints
Percentage
45.00%
40.00%
35.00%
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
40.50%
18.80%
8.00%
5.10%
8.50%
1.70%
3.70%
9.10%
4.60%
Menorrhagia
Metrorrhagia
Polymenorrhea
Metro-menorrhea
Post - menopausal bleeding
Post cortal bleeding
Polymenorrhagia
Oligomenorrhea
Dysmenorrhoea

Table 4: Parity		
	No. of Cases	**Percentage**
Nulliparus	22	6.3%
Low Parity	325	92.6%
High Parity	4	1.1%

The analysis of parity among patients with abnormal uterine bleeding revealed that the majority were of low parity (92.6%), indicating that most women had one or two previous pregnancies. Nulliparous women accounted for 6.3% of cases, while only a small fraction (1.1%) were of high parity, suggesting that AUB is more frequently reported among women with limited reproductive history rather than those with multiple childbirths. This distribution may reflect hormonal fluctuations, uterine conditions, or lifestyle factors more common in low parity women, highlighting the importance of considering reproductive history in the clinical evaluation of AUB.

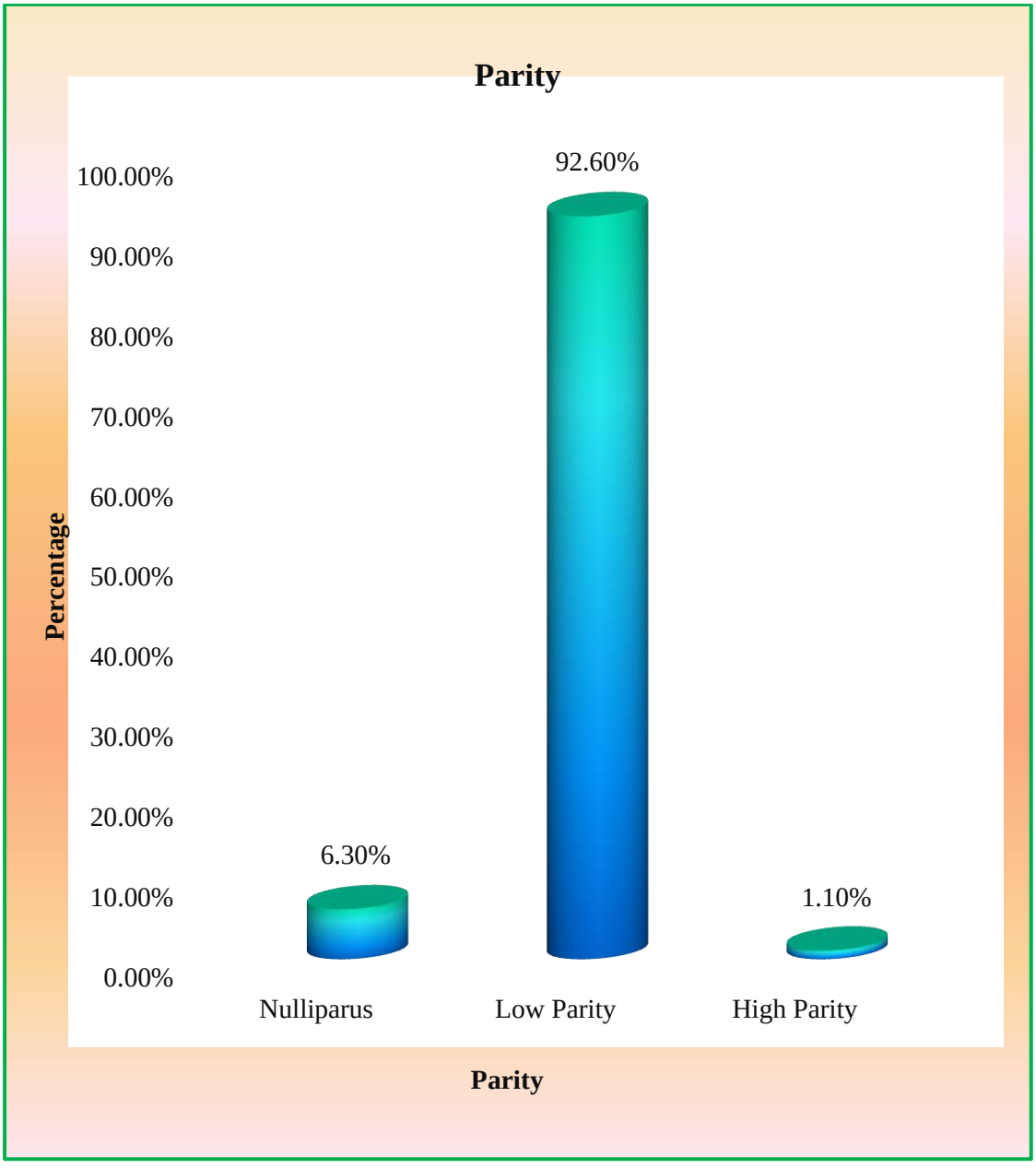

Parity
100.00%
90.00%
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
Percentage
92.60%
6.30%
1.10%
Nulliparus
Low Parity
High Parity
Parity

Table 5: Drug history		
	No. of Cases	**Percentage**
No	262	74.6%
Yes (hormonal intake)	89	25.4%

In this study, a significant majority of patients with abnormal uterine bleeding (74.6%) reported no history of hormonal drug intake, while 25.4% had a history of using hormonal medications. This suggests that although hormonal therapy is a known factor influencing endometrial changes, most cases of AUB in this cohort occurred independently of such treatment. However, the notable proportion of hormonal intake highlights the need to consider exogenous hormone exposure as a potential contributor to bleeding patterns and histopathological alterations in a subset of patients.

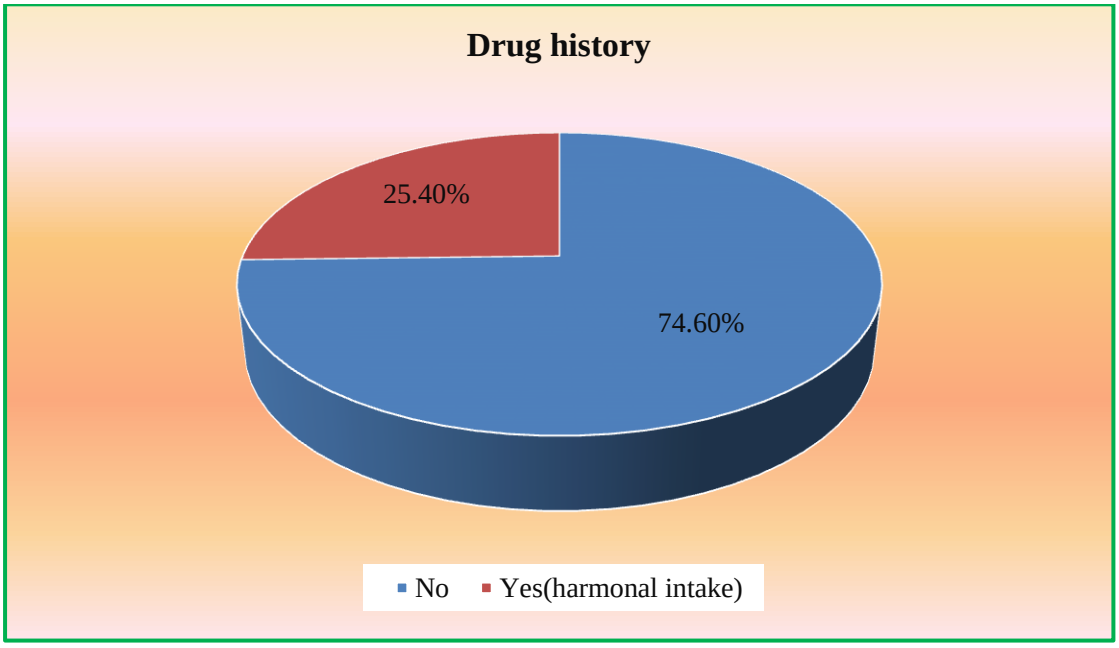


Table 6: Descriptive analysis			
	N	**Mean**	**Std. Deviation**
Histopathological diagnosis	351	3.91	3.335
Age	351	2.19	0.895
Complaints	351	3.15	2.620
Parity	351	1.95	0.268
Drug history	351	1.25	0.436
Correlation with LMP	351	1.40	0.490
Valid N (list wise)	351		

The table summarizes data from 351 AUB patients. The mean histopathological diagnosis score was 3.91, indicating varied endometrial patterns. Most patients were younger to middle-aged (mean age 2.19), with low parity (mean 1.95) and no history of hormonal intake (mean drug history 1.25). Clinical complaints (mean 3.15) and LMP correlation (mean 1.40) showed moderate variability. These findings suggest a predominantly low-parity, hormonally untreated group with diverse clinical and histopathological profiles.

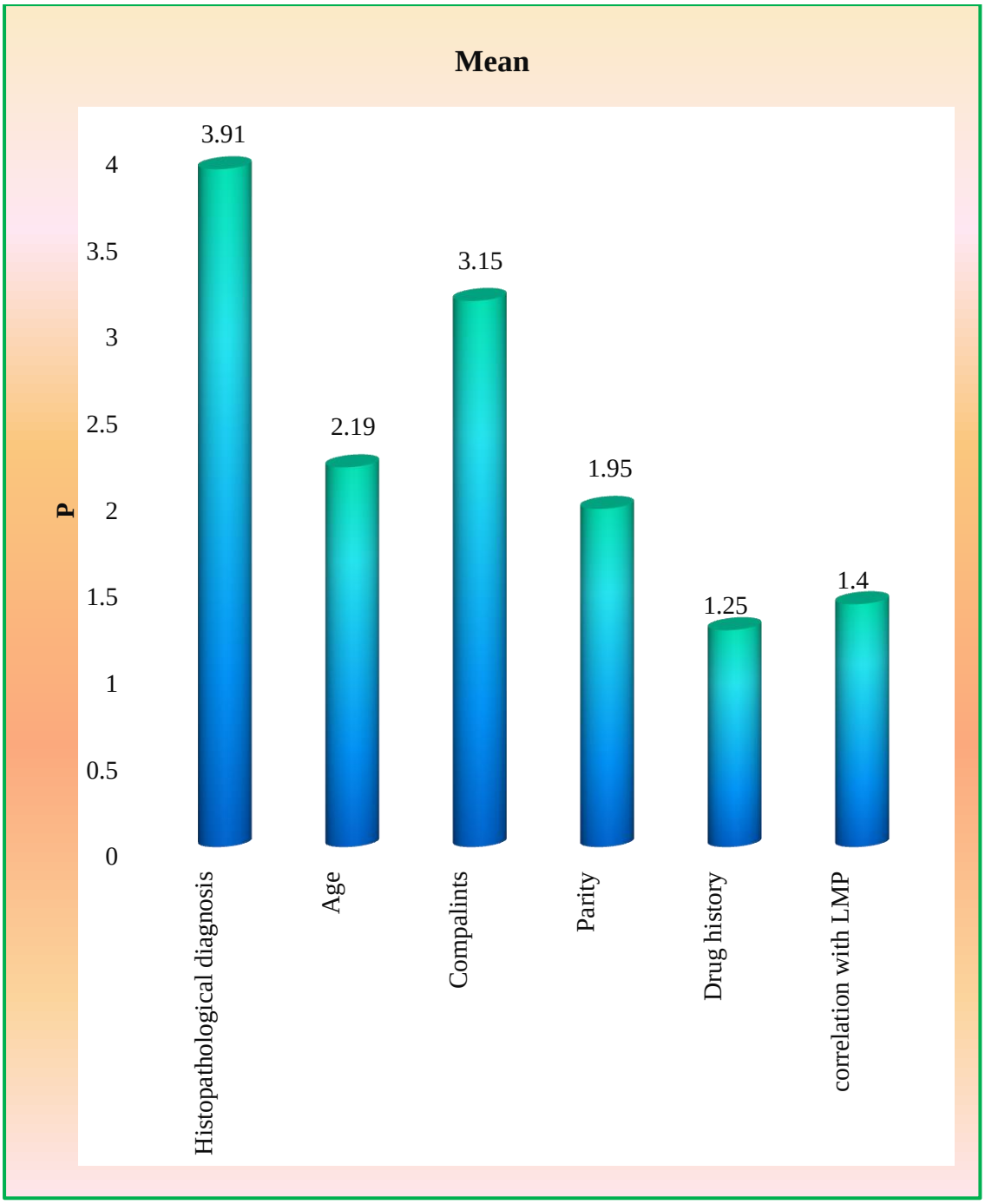

Mean
P
4
3.5
3
2.5
2
1.5
1
0.5
0
3.91
2.19
3.15
1.95
1.25
1.4
Histopathological diagnosis
Age
Compalints
Parity
Drug history
correlation with LMP

Table 7: Correlations of Histopathological diagnosis and age			
		Histopathological diagnosis	**Age**
Histopathological diagnosis	Pearson Correlation	1	.264**
	Sig. (2-tailed)		<.001
	N	351	351
Age	Pearson Correlation	0.264**	1
	Sig. (2-tailed)	<0.001	
	N	351	351
****. Correlation is significant at the 0.01 level (2-tailed)**			

The Pearson correlation analysis revealed a significant positive correlation between age and histopathological diagnosis in patients with abnormal uterine bleeding, with a correlation coefficient (r) of 0.264 and a p-value < 0.001. This indicates a moderate but statistically significant relationship, suggesting that as age increases, there is a tendency for more advanced or pathological histological changes to be observed in the endometrium. This finding supports the clinical understanding that older women, particularly in the perimenopausal and postmenopausal age groups, are more likely to develop endometrial hyperplasia, atypia, or carcinoma, underscoring the importance of age as a critical factor in the diagnostic evaluation of AUB.

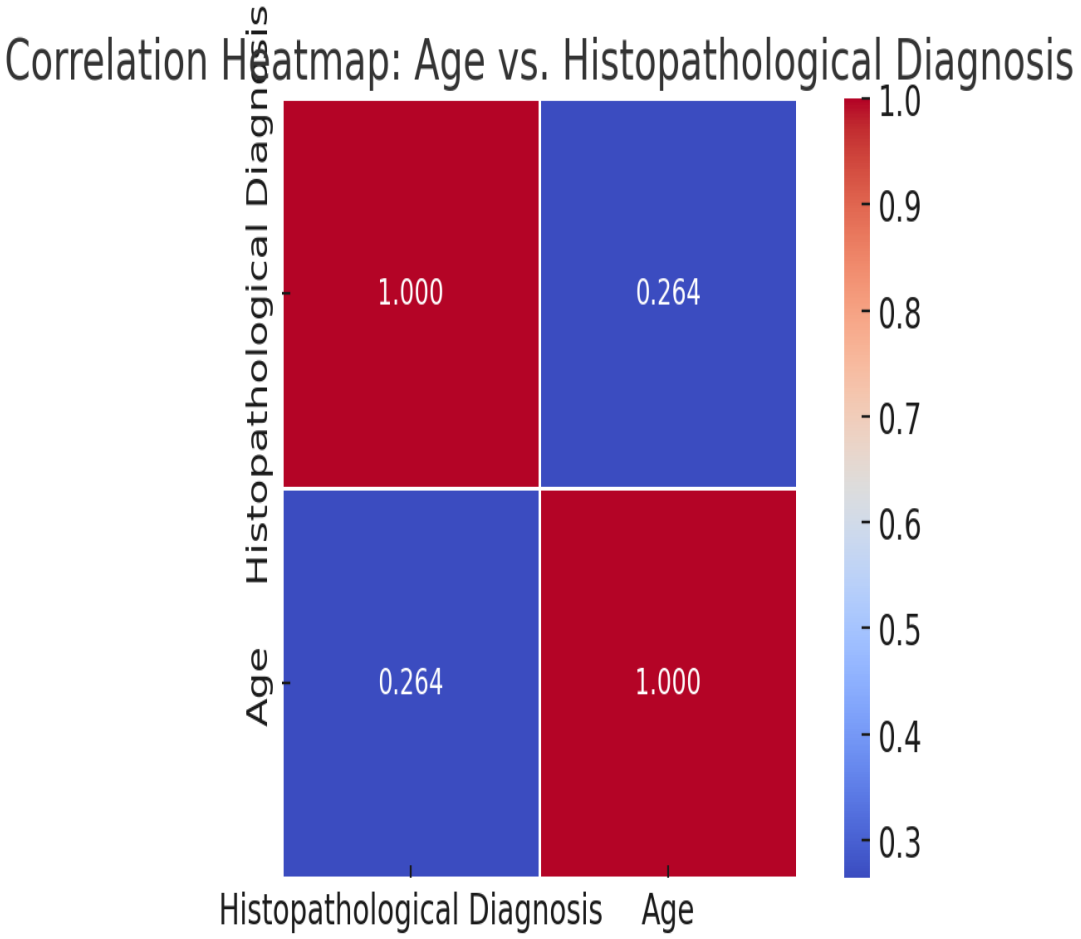

Correlation Heatmap: Age vs. Histopathological Diagnosis
Histopathological Diagnosis
Age
1.000
0.264
0.264
1.000
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
Histopathological Diagnosis
Age

Table 8: Correlations of Histopathological diagnosis Correlation with LMP			
		Histopathological diagnosis	**correlation with LMP**
Histopathological diagnosis	Pearson Correlation	1	.766**
	Sig. (2-tailed)		<.001
	N	351	351
correlation with LMP	Pearson Correlation	.766**	1
	Sig. (2-tailed)	<.001	
	N	351	351
****. Correlation is significant at the 0.01 level (2-tailed)**			

The Pearson correlation analysis between histopathological diagnosis and last menstrual period (LMP) showed a strong positive correlation ($r=0.766$), which is highly statistically significant ($p < 0.001$). This indicates that there is a strong and meaningful relationship between the timing of the LMP and the histopathological findings in patients with abnormal uterine bleeding. In other words, the phase of the endometrial cycle, as inferred from the LMP, closely aligns with the histological pattern observed, reinforcing the importance of menstrual history in accurately interpreting endometrial biopsy results. This correlation supports the validity of LMP as a reliable clinical parameter for understanding endometrial changes.

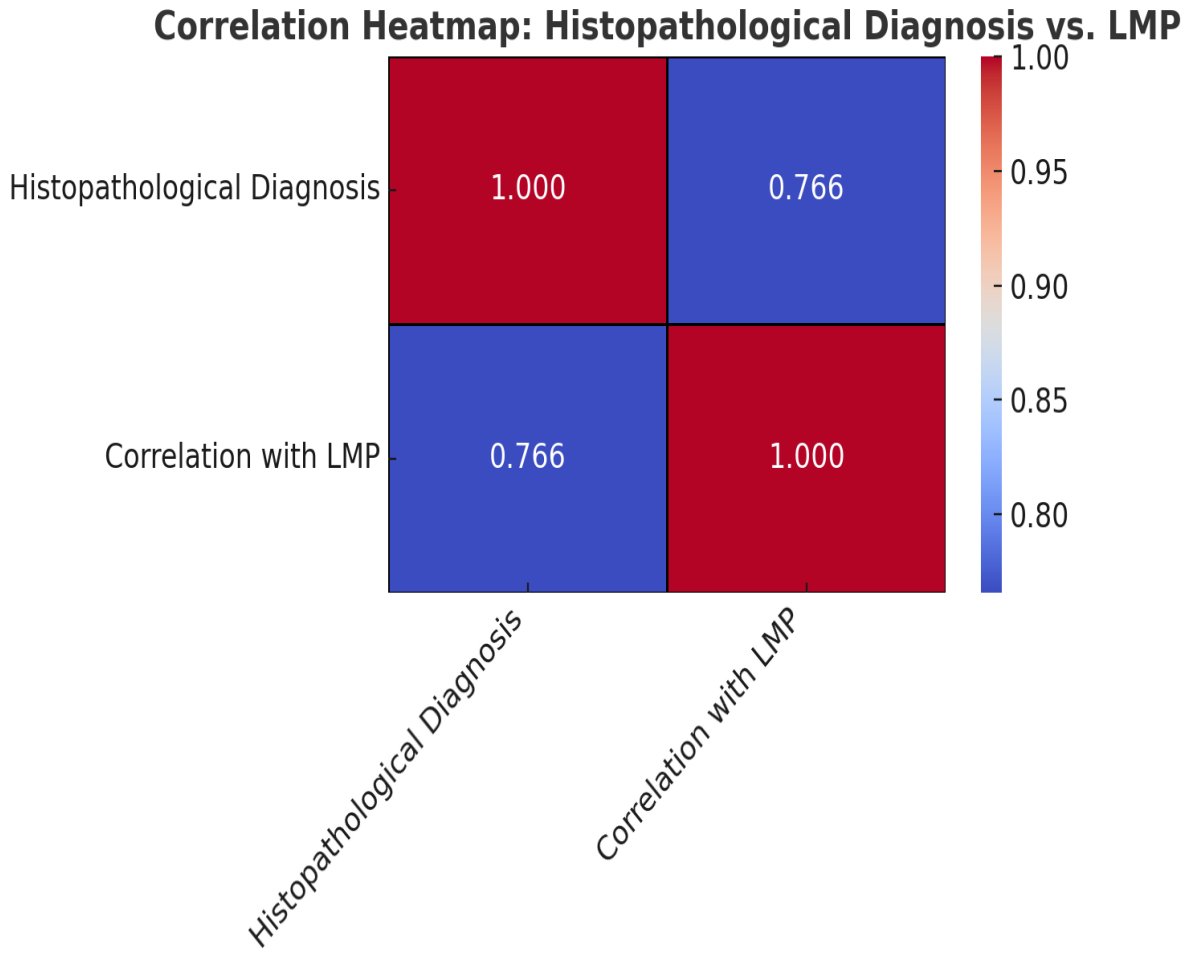

Correlation Heatmap: Histopathological Diagnosis vs. LMP
Histopathological Diagnosis
Correlation with LMP
1.000
0.766
0.766
1.000
1.00
0.95
0.90
0.85
0.80
Histopathological Diagnosis
Correlation with LMP

Table 8: Correlations of Histopathological diagnosis Drug history			
		Histopathological diagnosis	**Drug history**
Histopathological diagnosis	Pearson Correlation	1	.287**
	Sig. (2-tailed)		<.001
	N	351	351
Drug history	Pearson Correlation	.287**	1
	Sig. (2-tailed)	<.001	
	N	351	351
****. Correlation is significant at the 0.01 level (2-tailed)**			

The Pearson correlation analysis between histopathological diagnosis and drug history (hormonal intake) revealed a moderate positive correlation ($r = 0.287$), which is statistically significant ($p < 0.001$). This indicates that there is a meaningful association between a patient's history of hormonal medication use and the type of endometrial changes observed histologically. Specifically, patients with a history of hormonal intake are more likely to exhibit characteristic histopathological patterns such as pill endometrium or progestin-related changes, suggesting that prior hormonal exposure can influence the morphological appearance of the endometrium and must be considered during diagnostic interpretation.

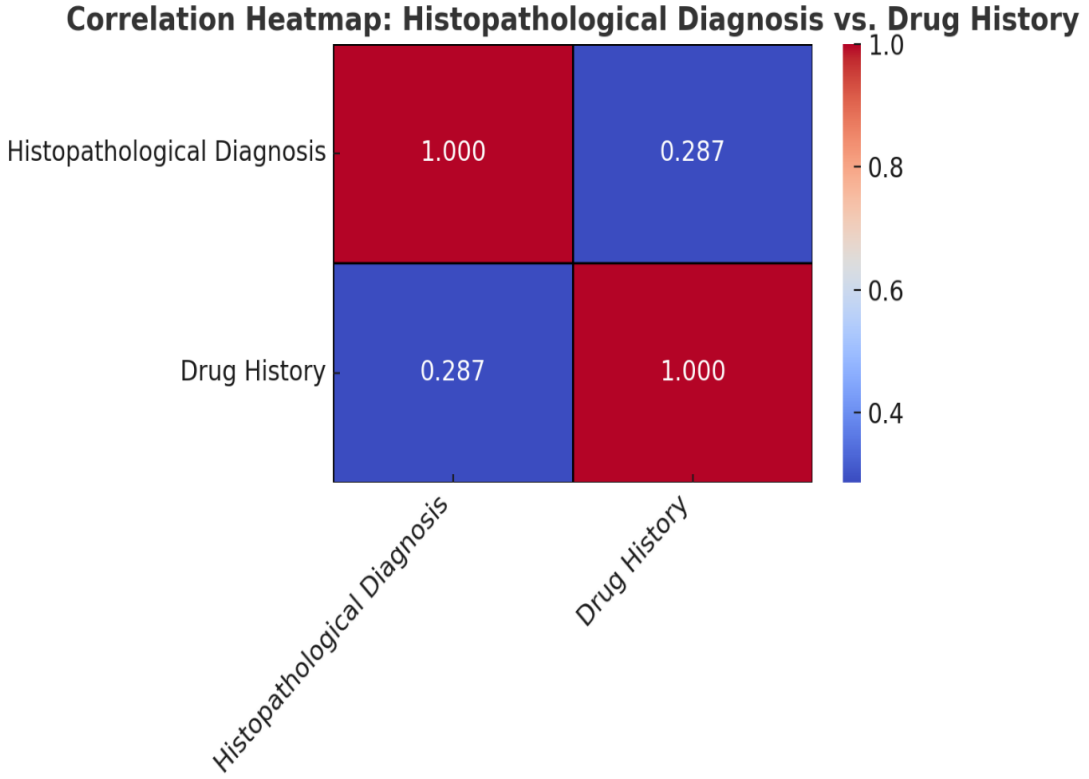
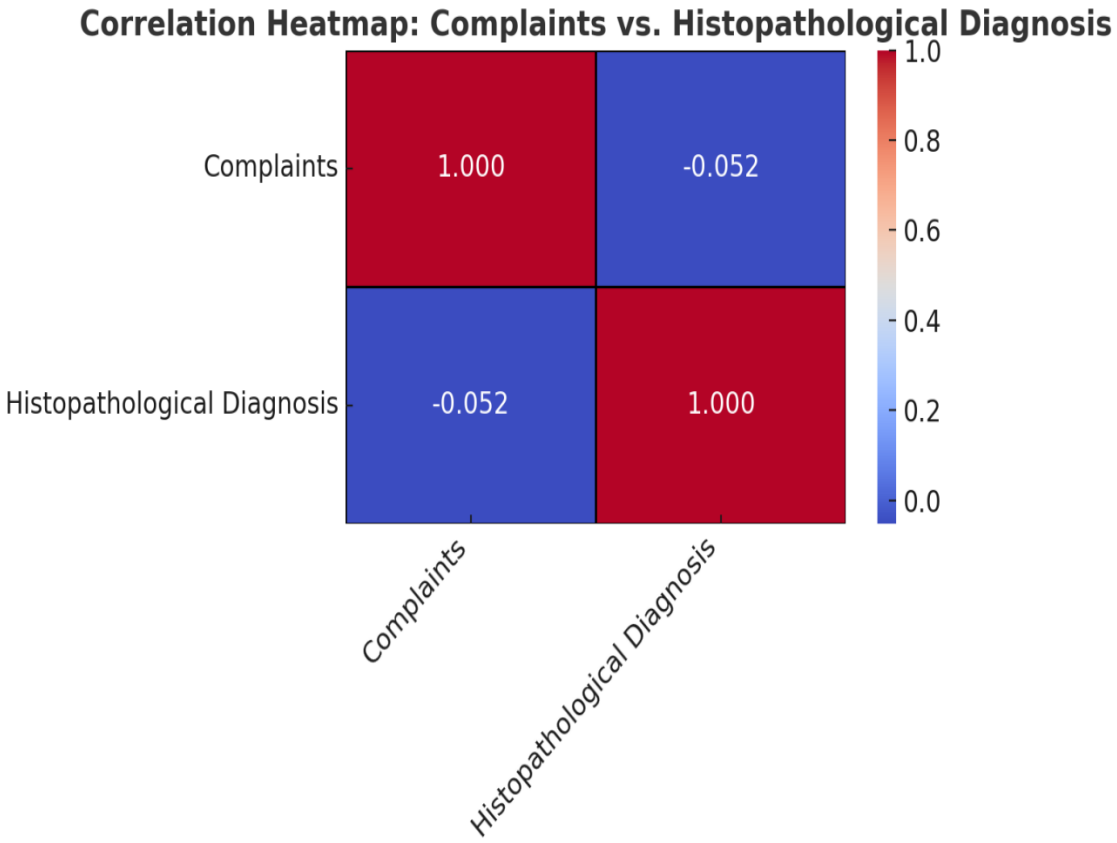

Correlation Heatmap: Histopathological Diagnosis vs. Drug History
Histopathological Diagnosis
Drug History
1.000
0.287
0.287
1.000
1.0
0.8
0.6
0.4
Histopathological Diagnosis
Drug History

Table 9: **Correlations of Complaints Histopathological diagnosis**			
		Complaints	Histopathological diagnosis
Complaints	Pearson Correlation	1	-.052
	Sig. (2-tailed)		.331
	N	351	351
Histopathological diagnosis	Pearson Correlation	-.052	1
	Sig. (2-tailed)	.331	
	N	351	351

The Pearson correlation analysis between clinical complaints and histopathological diagnosis revealed a very weak negative correlation (r=-0.052), which was not statistically significant (p = 0.331). This indicates that there is no meaningful relationship between the type of abnormal uterine bleeding symptoms presented by patients and the histopathological findings of the endometrium. In other words, clinical symptoms alone are not reliable predictors of the underlying endometrial pathology, highlighting the importance of histopathological evaluation for accurate diagnosis and management of AUB.


Correlation Heatmap: Complaints vs. Histopathological Diagnosis
Complaints
Histopathological Diagnosis
1.000
-0.052
-0.052
1.000
1.0
0.8
0.6
0.4
0.2
0.0
Complaints
Histopathological Diagnosis

DISCUSSION

Abnormal uterine bleeding (AUB) is a common yet multifactorial gynecological condition affecting women across various age groups, often necessitating detailed clinical and histopathological evaluation for accurate diagnosis and management. The present study was undertaken to assess the histopathological spectrum of endometrial changes in women with AUB and to explore their correlations with age, last menstrual period (LMP), parity, drug history (especially hormonal intake), and presenting complaints. In addition, correlation analyses were performed to determine the strength and significance of associations between these variables. The findings of this study were compared with several previous national and international studies to evaluate similarities and deviations in trends, frequencies, and histological patterns. This comparative approach enhances our understanding of endometrial pathology in AUB and helps contextualize the current findings within the broader landscape of gynecological research.

Age Distribution

In the current study, the majority of patients with abnormal uterine bleeding (AUB) were in the 31–40 years age group (47.6%), followed by the 41–50 years group (24.8%). These findings are consistent with

multiple studies. Vaidya et al. reported that the majority of AUB cases occurred in women aged 40–49 years (47.18%). Forae and Aligbe also found a similar peak incidence in the fourth decade, with a mean age of 38.8 years. Bodal et al. observed that most DUB cases were seen in the 41–50 age group (40.91%). Likewise, Gaikwad et al. found the 31–40 years group to be most commonly affected.

Clinical Complaints

Menorrhagia (40.5%) was the most common presenting complaint in our study, followed by metrorrhagia (18.8%) and oligomenorrhea (9.1%). These findings align with those of Khan R et al., who reported menorrhagia as the most common complaint, seen in 48.2% of patients. Similarly, Verma U et al. identified menorrhagia in 45% of patients with AUB. Talukdar B et al. observed that 67.97% of patients presenting with AUB had menorrhagia. Doraiswami S et al. also emphasized the predominance of excessive bleeding symptoms like menorrhagia and metrorrhagia

Histopathological Findings

The most common histological patterns noted were secretory (29.3%) and proliferative (28.2%) endometrium, which are consistent

with normal cyclical changes. Similar findings were reported by Khan S et al., who documented proliferative (46.4%) and secretory (37.6%) endometrium as the most frequent patterns. Vaidya et al. reported normal cyclical patterns in 40.94% of cases, and Kinake M et al. also found that cyclical endometrium was the most common pattern in their cohort. Inal ZO et al. likewise noted a predominance of proliferative-secretory endometrium in 63.62% of cases.

Endometrial hyperplasia without atypia was seen in 12% of cases, which closely matches the findings of Gupta A et al. (19%) and Manjari and Kumar (29.4%). Atypical hyperplasia was observed in 2.8%, similar to reports by Nagose VB et al. (seen in women with endometrial thickness >10 mm). Endometrial carcinoma was detected in 1.4% of cases, which correlates with the incidence reported by Sujatha R et al. (0.5%) and Kinake M et al. (0.44%)

Parity

Low parity was predominant (92.6%) among AUB cases, followed by nulliparous women (6.3%). This pattern suggests that AUB is not restricted to multiparous women, as traditionally believed. A study by Bindhuja J et al. also observed that most patients with AUB were of low

parity. Dubey A et al. found that many perimenopausal women with AUB were para 2 or 3, aligning with our findings. Gupta A et al. also reported a predominance of women with low to moderate parity. Khan R et al. showed similar findings with no strong correlation between high parity and AUB

Drug History

In our study, 25.4% of patients reported a history of hormonal drug use. This is in line with findings by Nepal N et al., where hormonal influence on endometrial morphology was noted in a considerable number of cases. Cheheb N et al. reported that hormonal treatment was associated with hyperplasia and pill endometrium. Similarly, Bhagat R et al. noted that exogenous hormone effects were visible in histopathological samples of AUB patients. Betha K et al. highlighted that hormone-related iatrogenic causes formed a significant portion of non-structural AUB cases

Histopathological Diagnosis and Age

A moderate positive correlation was found between age and histopathological diagnosis ($r = 0.264$, $p < 0.001$), suggesting that pathological findings increase with age. This is corroborated by

Doraiswami S et al., who found a significant association between increasing age and endometrial hyperplasia or carcinoma. Vani B et al. also noted age-specific associations between endometrial lesions and increasing severity. Similarly, Ranjan S et al. found a significant age trend for hyperplastic and malignant changes in endometrium ($p < 0.008$). Manjari and Kumar also observed hyperplasia and carcinoma predominantly in older women

Histopathological Diagnosis and LMP

A strong positive correlation ($r = 0.766$, $p < 0.001$) was found between histopathological diagnosis and the last menstrual period (LMP). This highlights the importance of clinical context in interpreting endometrial histology. The role of LMP in synchronizing with histopathology has been acknowledged by Bhagat R et al. and Pathak M et al., who emphasized the value of clinical correlation in accurate interpretation. Somasundar BSM et al. also stressed that the diagnostic value improves when histology is interpreted in light of menstrual history.

Histopathological Diagnosis and Drug History

A moderate correlation ($r = 0.287$, $p < 0.001$) was noted between histopathology and history of hormonal intake. This supports findings by Nepal N et al., and Kinake M et al., where hormonal history influenced patterns such as pill endometrium and hyperplasia. Ahmed M et al. also noted endometrial changes related to hormone exposure in infertile women.

Histopathological Diagnosis and Presenting Complaint

The correlation between presenting complaint and histopathological diagnosis was weak and statistically insignificant ($r = -0.052$, $p = 0.331$). Similar findings were reported by Doraiswami S et al., who found poor correlation between clinical complaints and histological patterns. Vaidya S et al. and Rizvi SA et al. emphasized the necessity of histopathology despite non-specific clinical symptoms. Samal R et al. also reported a wide clinicopathological disparity in AUB patients.

RECOMMENDATIONS

Routine Histopathological Evaluation in AUB Cases: All patients presenting with abnormal uterine bleeding, particularly those above 35 years and perimenopausal/postmenopausal women, should undergo endometrial sampling for histopathological evaluation. This is essential to rule out preneoplastic and malignant conditions, even in the absence of alarming clinical symptoms, as clinical presentation alone may not reliably predict underlying pathology.

Importance of Menstrual History (LMP) in Interpretation: Accurate menstrual history should be documented in all AUB cases, as our study and others demonstrated a strong correlation between histopathological patterns and the last menstrual period. This can significantly improve diagnostic accuracy and help in differentiating normal cyclical changes from pathological lesions.

Hormonal Drug Use Should Be Considered in Diagnostic Workup: A detailed drug history, particularly of hormonal therapy, should be included in the clinical evaluation of AUB patients, as hormonal intake can significantly alter endometrial morphology and mimic or mask pathological changes.

Standardized Use of PALM-COEIN Classification: The adoption of the FIGO PALM-COEIN classification system in clinical settings is recommended to ensure standardized documentation, improve diagnostic clarity, and facilitate better research and clinical comparisons.

Integration of Ultrasound and Histopathology: While ultrasound can aid in identifying structural causes of AUB, such as polyps or fibroids, it should be complemented by histopathology to detect non-structural causes like hyperplasia or hormonal changes. A combined diagnostic approach enhances overall accuracy.

Need for Awareness and Early Evaluation: Public health initiatives and clinical education programs should emphasize the importance of early evaluation of AUB, especially in women at risk due to age or hormonal factors. This can facilitate timely detection of malignant or premalignant lesions and reduce morbidity.

Further Research and Multi-Centric Studies: Multi-center and longitudinal studies with larger and diverse populations are recommended to better understand regional, genetic, and environmental influences on the histopathological spectrum of AUB and to refine screening strategies accordingly.

SUMMARY

Abnormal Uterine Bleeding (AUB) remains a prevalent gynecological complaint across reproductive, perimenopausal, and postmenopausal age groups. This study was conducted to evaluate the histopathological patterns in endometrial biopsies and curettage specimens of women presenting with AUB and to correlate these findings with clinical parameters such as age, last menstrual period (LMP), drug history, and presenting complaints.

The most commonly observed histopathological patterns were secretory phase endometrium (29.3%) and proliferative phase endometrium (28.2%), indicating that a significant proportion of AUB cases may reflect normal cyclical changes. However, notable pathological findings included endometrial hyperplasia without atypia (12%), endometrial polyps (5.4%), and endometrial hyperplasia with atypia (2.8%). Importantly, 1.4% of cases were diagnosed as endometrial carcinoma, underscoring the need for early diagnostic evaluation of AUB, especially in older age groups.

The age distribution showed that AUB was most prevalent in the 31–40 years age group (47.6%), followed by women aged 41–50 years, suggesting that perimenopausal hormonal fluctuations may play a

significant role. Menorrhagia (40.5%) was the most frequent complaint, further supporting the need for histopathological assessment to differentiate normal from pathological bleeding.

Correlation studies revealed a strong positive correlation between histopathological diagnosis and LMP ($r = 0.766$, $p < 0.001$), indicating that endometrial changes closely reflect menstrual cycle timing.

A moderate positive correlation between histopathological diagnosis and drug history ($r = 0.287$, $p < 0.001$), suggesting hormonal intake may influence endometrial morphology.

CONCLUSION

This study reinforces that while abnormal uterine bleeding (AUB) is frequently associated with benign, cyclical changes in the endometrium, a significant proportion of patients may present with premalignant or malignant conditions that are not evident through clinical assessment alone. Histopathological examination remains the gold standard for accurately identifying the underlying pathology, particularly in women over 35 years of age, those with prolonged or unexplained bleeding, and those with a history of hormonal therapy.

The observed strong correlation between histopathological findings and last menstrual period (LMP) emphasizes the critical role of menstrual history in interpreting endometrial changes. Likewise, the moderate association with hormonal drug history highlights the influence of exogenous hormones on endometrial morphology and the importance of documenting medication use during clinical evaluation. Conversely, the lack of significant correlation between presenting symptoms and histopathology underscores the limitations of relying solely on clinical complaints for diagnosis.

Given the broad spectrum of endometrial pathologies and the potential risk of missed or delayed diagnoses, this study advocates for a comprehensive and standardized approach to AUB evaluation. Incorporating detailed clinical history, ultrasonographic findings, and routine histopathological sampling can lead to more accurate diagnoses, appropriate interventions, and ultimately improved patient outcomes. As AUB continues to affect the quality of life and reproductive health of countless women, such an integrated diagnostic strategy is essential for delivering effective and timely gynecological care.

LIMITATIONS

This study is limited by its single-center design and lack of patient follow-up, which may affect the generalizability and long-term relevance of the findings. Additionally, the absence of radiological and hormonal correlation, reliance on patient-reported data, occasional sample inadequacy, and non-use of the FIGO PALM-COEIN classification may have impacted the comprehensiveness and standardization of the diagnostic evaluation.

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