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Research Article

Frequency of Structural and Hormonal Causes of Abnormal Uterine Bleeding (AUB) in Perimenopausal Women

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ABSTRACT
Background: Abnormal uterine bleeding (AUB) is one of the most frequent gynecological complaints during the perimenopausal period. It may result from structural uterine pathology, such as leiomyoma, endometrial polyps, adenomyosis, hyperplasia and malignancy, or from hormonal disturbances including ovulatory dysfunction, thyroid disease, hyperprolactinemia and polycystic ovarian syndrome. Timely evaluation is essential because perimenopausal AUB may be the first clinical manifestation of premalignant or malignant endometrial disease.
Objective: To determine the frequency of structural and hormonal causes of abnormal uterine bleeding among perimenopausal women.
Methods: This descriptive cross-sectional study included 195 perimenopausal women aged 40-55 years presenting with AUB. Detailed menstrual history, clinical examination, pelvic ultrasonography, thyroid profile, serum prolactin and relevant hormonal evaluation were performed. Endometrial sampling was done where indicated, particularly in women aged 45 years or older, those with thickened endometrium, persistent bleeding or risk factors for endometrial pathology. Causes were classified as structural or hormonal according to clinical, sonographic, laboratory and histopathological findings. Data were analyzed as frequencies and percentages.
Results: The mean age of patients was 47.8 +/- 4.2 years. Heavy menstrual bleeding was the most common bleeding pattern, observed in 86 patients (44.1%), followed by irregular bleeding in 48 (24.6%), prolonged bleeding in 32 (16.4%), intermenstrual bleeding in 19 (9.7%) and frequent cycles in 10 (5.1%). Structural causes were identified in 128 patients (65.6%), while hormonal causes were found in 67 patients (34.4%). Among structural causes, leiomyoma was most frequent, seen in 52 patients (26.7%), followed by endometrial polyp in 30 (15.4%), adenomyosis in 22 (11.3%), endometrial hyperplasia in 18 (9.2%) and endometrial malignancy in 6 (3.1%). Among hormonal causes, perimenopausal ovulatory dysfunction was the most common, observed in 35 patients (17.9%), followed by hypothyroidism in 18 (9.2%), hyperprolactinemia in 7 (3.6%), polycystic ovarian syndrome in 5 (2.6%) and hyperthyroidism in 2 (1.0%).
Conclusion: Structural causes were more frequent than hormonal causes of AUB in perimenopausal women. Leiomyoma was the leading structural cause, while ovulatory dysfunction was the most common hormonal cause. Careful clinical assessment, pelvic ultrasonography, hormonal workup and selective endometrial sampling are essential for early diagnosis and appropriate management.

Keywords: Abnormal Uterine Bleeding, Perimenopause, Leiomyoma, Endometrial Polyp, Ovulatory Dysfunction, Hypothyroidism, Endometrial Hyperplasia.

INTRODUCTION

Abnormal uterine bleeding is defined as bleeding from the uterine corpus that is abnormal in volume, regularity, frequency or duration and occurs in the absence of pregnancy. It represents a major burden in

gynecological practice and affects quality of life, physical health and psychological well-being. The perimenopausal period is particularly important because hormonal fluctuations and declining ovarian reserve commonly result in irregular ovulation, while the risk of structural uterine pathology also increases with age [1, 2].

The International Federation of Gynecology and Obstetrics introduced the PALM-COEIN classification to standardize the causes of AUB. The PALM group includes structural causes: polyp, adenomyosis, leiomyoma and malignancy/hyperplasia. The COEIN group includes non-structural causes: coagulopathy, ovulatory dysfunction, endometrial causes, iatrogenic causes and causes not otherwise classified [3,4]. In perimenopausal women, the most clinically relevant causes usually include leiomyoma, endometrial polyp, adenomyosis, endometrial hyperplasia, malignancy, ovulatory dysfunction and endocrine disorders such as thyroid disease and hyperprolactinemia [5].

Perimenopausal anovulation is a common hormonal mechanism of AUB. Failure of ovulation leads to inadequate progesterone production and persistent estrogenic stimulation of the endometrium, resulting in irregular, heavy or prolonged bleeding [6]. Thyroid dysfunction may also disturb menstrual cyclicity through effects on sex hormone-binding globulin, gonadotropin secretion, prolactin levels and peripheral estrogen metabolism [7]. Similarly, hyperprolactinemia and polycystic ovarian syndrome may cause ovulatory disturbance and irregular bleeding [8].

Structural uterine lesions are also frequent in this age group. Leiomyomas may cause heavy or prolonged bleeding by increasing endometrial surface area, impairing uterine contractility and altering local vascular regulation. Endometrial polyps commonly present with intermenstrual or irregular bleeding, while adenomyosis is associated with heavy menstrual bleeding and dysmenorrhea [9]. Endometrial hyperplasia and malignancy require special attention, as abnormal bleeding may be the earliest warning sign of premalignant or malignant disease [10].

The present study was conducted to determine the frequency of structural and hormonal causes of AUB among perimenopausal women, with the aim of supporting timely diagnosis and appropriate management.

METHODOLOGY

Study Design and Setting

This descriptive cross-sectional study was conducted in the Department of Obstetrics and Gynecology of Nishtar Medical University/Hospital, Multan. The institutional ethical approval was obtained.

Study Duration

The study was carried out over a period of six months from October 2025 to March 2026.

Sample Size

A total of 195 perimenopausal women presenting with abnormal uterine bleeding were included.

Inclusion Criteria

Women aged 40-55 years presenting with abnormal uterine bleeding were included. AUB was considered when bleeding was abnormal in frequency, regularity, duration or volume.

Exclusion Criteria

Pregnant women, women with postmenopausal bleeding, patients using anticoagulant therapy, women with known bleeding disorders, patients with cervical or vaginal causes of bleeding, and those unwilling to participate were excluded.

Data Collection Procedure

After informed consent, demographic details, parity, body mass index, menstrual history, duration of symptoms and bleeding pattern were recorded. General physical, systemic and pelvic examinations were performed. Baseline investigations included complete blood count, thyroid-stimulating hormone, serum prolactin and other hormonal tests where clinically indicated. Pelvic ultrasonography was performed to assess uterine size, fibroids, adenomyosis, endometrial thickness, ovarian morphology and focal endometrial lesions. Endometrial sampling was performed in women aged 45 years or older, those with persistent or heavy bleeding, thickened endometrium, intermenstrual bleeding or risk factors for endometrial pathology.

Classification of Causes

Patients were categorized according to the most likely primary cause of AUB. Structural causes included leiomyoma, endometrial polyp, adenomyosis, endometrial hyperplasia and malignancy. Hormonal causes included ovulatory dysfunction, hypothyroidism, hyperthyroidism, hyperprolactinemia and polycystic ovarian syndrome.

Statistical Analysis

Data were analyzed using descriptive statistics. Quantitative variables were expressed as mean +/- standard deviation.

Qualitative variables were presented as frequencies and percentages.

RESULTS

A total of 195 perimenopausal women with AUB were included. The mean age was 47.8 +/- 4.2 years. Most patients belonged to the age group of 46-50 years. Multiparity was common, and the majority of patients presented with symptoms for more than three months.

Table 1. Baseline Characteristics of Study Participants

Variable	Frequency	Percentage
Age group		
40-45 years	58	29.7%
46-50 years	88	45.1%
51-55 years	49	25.1%
Parity		
Nulliparous	11	5.6%
Para 1-2	52	26.7%
Para 3-4	91	46.7%
Para >=5	41	21.0%
Body mass index		
Normal	56	28.7%
Overweight	83	42.6%
Obese	56	28.7%

Heavy menstrual bleeding was the most common bleeding pattern, followed by irregular bleeding, prolonged bleeding, intermenstrual bleeding and frequent cycles.

Table 2. Pattern of Abnormal Uterine Bleeding

Bleeding Pattern	Frequency	Percentage
Heavy menstrual bleeding	86	44.1%
Irregular bleeding	48	24.6%
Prolonged bleeding	32	16.4%
Intermenstrual bleeding	19	9.7%
Frequent cycles	10	5.1%
Total	195	100%

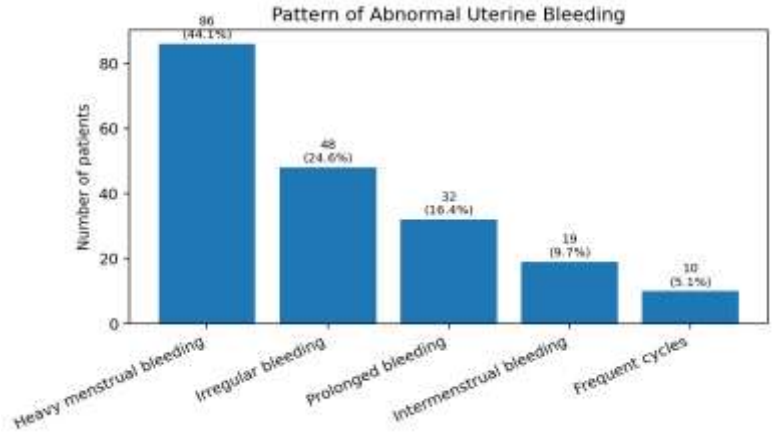

Figure 1. Pattern of abnormal uterine bleeding among study participants

Structural causes were more common than hormonal causes. Overall, structural lesions were found in 128 patients (65.6%), while hormonal causes were identified in 67 patients (34.4%).

Table 3. Frequency of Structural and Hormonal Causes of AUB

Cause of AUB	Frequency	Percentage
Structural causes	128	65.6%
Leiomyoma	52	26.7%
Endometrial polyp	30	15.4%
Adenomyosis	22	11.3%
Endometrial hyperplasia	18	9.2%
Endometrial malignancy	6	3.1%
Hormonal causes	67	34.4%
Perimenopausal ovulatory dysfunction	35	17.9%
Hypothyroidism	18	9.2%
Hyperprolactinemia	7	3.6%
Polycystic ovarian syndrome	5	2.6%
Hyperthyroidism	2	1.0%
Total	195	100%

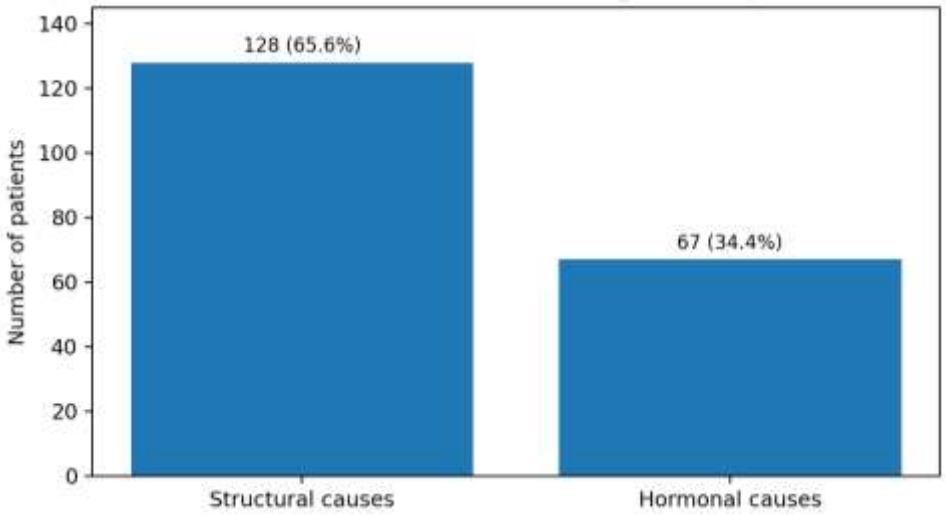

Figure 2. Overall Distribution of Structural and Hormonal Causes of AUB

Among structural causes, leiomyoma was the most frequent diagnosis, followed by endometrial polyp and adenomyosis. Among hormonal causes, ovulatory dysfunction was the leading cause, followed by hypothyroidism.

Table 4. Age-Wise Distribution of Structural and Hormonal Causes

Age Group	Structural Causes	Hormonal Causes	Total
40-45 years	30	28	58
46-50 years	60	28	88
51-55 years	38	11	49
Total	128	67	195

Table 5. Diagnostic Findings among Study Participants

Finding	Frequency	Percentage
Anemia, Hb <11 g/dL	82	42.1%
Endometrial thickness >12 mm	39	20.0%
Enlarged uterus on ultrasound	61	31.3%
Focal endometrial lesion	30	15.4%
Abnormal thyroid profile	20	10.3%
Raised serum prolactin	7	3.6%

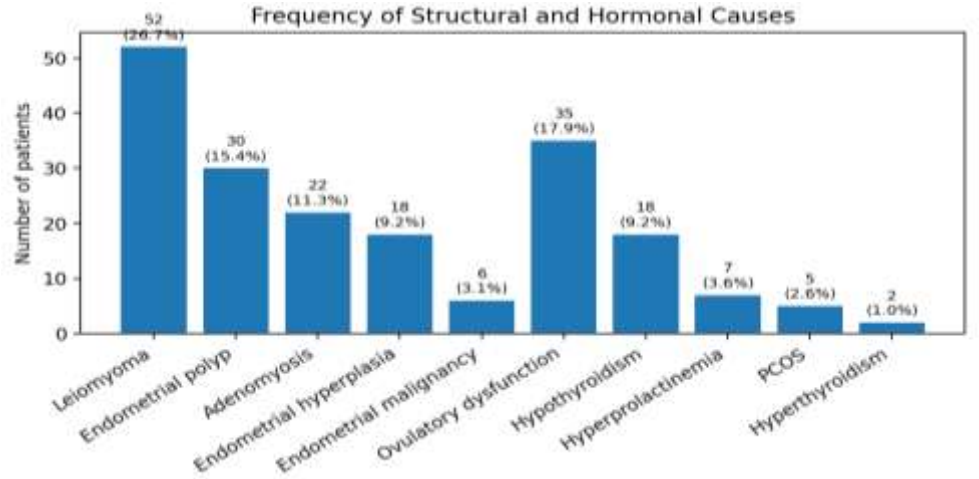

Figure 3. Frequency of Specific Structural and Hormonal Causes of AUB

Structural causes increased with advancing age, particularly among women older than 45 years. Hormonal causes, especially ovulatory dysfunction, were more common in the early perimenopausal age group.

DISCUSSION

The present study showed that structural causes were more frequent than hormonal causes of AUB in perimenopausal women. Out of 195 patients, 128 (65.6%) had structural pathology, while 67 (34.4%) had hormonal causes. This finding is consistent with the concept that advancing reproductive age is associated with increasing frequency of uterine pathology, including leiomyoma, endometrial polyp, adenomyosis and endometrial hyperplasia [11,12].

Leiomyoma was the most common structural cause in this study, affecting 52 patients (26.7%). Fibroids are well-recognized causes of heavy menstrual bleeding, particularly when submucosal or intramural lesions distort the uterine cavity. Their association with AUB is explained by increased endometrial surface area, altered angiogenesis, venous ectasia and impaired myometrial contractility [13]. Studies from different populations have also reported leiomyoma as one of the leading causes of AUB in women approaching menopause [14].

Endometrial polyp was the second most common structural cause, observed in 30 patients (15.4%). Polyps may present with intermenstrual bleeding, irregular bleeding or heavy menstrual bleeding. In perimenopausal women, focal endometrial lesions should be carefully evaluated because blind sampling may miss localized pathology. Ultrasonography, saline infusion sonography and hysteroscopy improve detection of polyps and other focal lesions [15].

Adenomyosis was identified in 22 patients (11.3%). It is commonly associated with heavy menstrual bleeding, dysmenorrhea and enlarged tender uterus. The diagnosis is usually suggested by ultrasound findings such as heterogeneous myometrium, myometrial cysts, asymmetrical uterine wall thickening and globular uterine enlargement. Adenomyosis often coexists with leiomyoma or endometrial pathology, which may increase bleeding severity [16].

Endometrial hyperplasia was found in 18 patients (9.2%), while endometrial malignancy was diagnosed in 6 patients (3.1%). Although malignancy was less frequent, its clinical significance is high. Perimenopausal women with persistent, heavy, irregular or intermenstrual bleeding require proper evaluation to exclude premalignant and malignant endometrial disease. Current recommendations support endometrial sampling in women aged 45 years or older presenting with AUB and in younger women with risk factors or persistent symptoms [17,18].

Among hormonal causes, ovulatory dysfunction was the most common, observed in 35 patients (17.9%). During perimenopause, ovarian follicular depletion leads to irregular follicular development and inconsistent ovulation. Anovulatory cycles cause inadequate progesterone exposure and unopposed estrogenic stimulation of the endometrium, leading to unpredictable, heavy or prolonged bleeding [19]. This mechanism explains why hormonal AUB was more common among women aged 40-45 years in the present study.

Hypothyroidism was identified in 18 patients (9.2%), making it the second most common hormonal cause. Thyroid dysfunction may cause menstrual disturbance by altering gonadotropin secretion, prolactin levels, estrogen metabolism and coagulation factors. Several studies have demonstrated a relationship between thyroid dysfunction and AUB, supporting thyroid testing as part of the evaluation in selected patients [20,21].

Hyperprolactinemia was found in 7 patients (3.6%). Raised prolactin may suppress gonadotropin-releasing hormone pulsatility, leading to luteal phase defects, anovulation and irregular bleeding. Polycystic ovarian syndrome was identified in 5 patients (2.6%), while hyperthyroidism was found in 2 patients (1.0%). Although these causes were less common, they remain clinically important because correction of endocrine disturbance may improve bleeding and prevent unnecessary surgical intervention [22].

The present study also showed that heavy menstrual bleeding was the most common bleeding pattern, affecting 44.1% of patients. This finding is comparable with published literature showing that heavy bleeding is a frequent presentation of fibroids, adenomyosis, endometrial hyperplasia and ovulatory dysfunction [23]. Anemia was present in 42.1% of participants, indicating the clinical burden of AUB and the need for early diagnosis and treatment.

AUB in perimenopausal women requires a systematic approach. Clinical history and examination help identify the bleeding pattern and risk factors. Ultrasonography is an important first-line imaging modality for detecting leiomyoma, adenomyosis, endometrial thickness and focal lesions. Laboratory tests should be individualized but commonly include complete blood count, pregnancy test where relevant, thyroid profile and prolactin level. Endometrial sampling remains essential in older perimenopausal women and those with risk factors for endometrial pathology [24,25].

The main limitation of this study was its descriptive design, which did not assess treatment outcomes. Secondly, the study was conducted in a single tertiary care setting, which may limit generalizability. However, the study provides useful data regarding the frequency of structural and hormonal causes of AUB in perimenopausal women.

CONCLUSION

Structural causes were more common than hormonal causes of abnormal uterine bleeding in perimenopausal women. Leiomyoma was the most frequent structural cause, followed by endometrial polyp and adenomyosis. Among hormonal causes, perimenopausal ovulatory dysfunction was most common, followed by hypothyroidism. Because endometrial hyperplasia and malignancy were also detected, careful evaluation of perimenopausal AUB is essential. A combined approach using clinical assessment, pelvic ultrasonography, hormonal evaluation and endometrial sampling where indicated can improve diagnosis and guide appropriate management.

Declarations

Consent: Written informed consent was obtained from all participants.

Conflict of interest: The authors declare no conflict of interest.

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