

Research Article

Endometrial Abnormalities in Women with Abnormal Uterine Bleeding, Association with Obesity, Hormonal Disturbances, and Treatment Patterns. A Clinical Cross-Sectional Study

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Abstract

Background: Abnormal uterine bleeding (AUB) is a prevalent gynecological disorder associated with significant morbidity and is frequently linked to endometrial abnormalities, hormonal disturbances, and metabolic factors such as obesity. Early identification of underlying endometrial pathology is essential to guide appropriate management and prevent progression to premalignant or malignant conditions.

Objective: To assess the range of endometrial abnormalities in women with AUB and to examine how they are related to obesity, hormonal derangements, and treatment patterns.

Methods: This cross-sectional study was conducted on 100 women presenting with AUB from January 2024 to January 2025 at the Department of Obstetrics and Gynaecology, Sandeman Provincial Hospital, Quetta, Pakistan. Clinical evaluation, body mass index (BMI) assessment, hormonal profiling (TSH, estrogen, progesterone), ultrasonography, and endometrial biopsy were performed. The analysis was conducted with SPSS version 26, and $p < 0.05$ was regarded as statistically significant.

Results: The average age of the participants was 38.9 ± 7.8 years, with 48.0% of them being obese. Abnormalities of the endometria were found in 70.0% of patients, with the most frequent pattern of hormonal imbalance (28.0%), proliferative (17.0%), and secretory endometria (13.0%). A diagnosis of endometrial hyperplasia was made in 9.0% of cases, and carcinoma was confirmed in 2.0%. Hormonal imbalances occurred in 56.0% of the patients, with hypothyroidism being the most prevalent (32.0%). Statistically significant correlation was found between endometrial hyperplasia and obesity ($p = 0.02$). In 65.0% of the patients, medical management was used, and 35.0% of the patients needed surgical intervention.

Conclusion: Hormonal imbalance and obesity are closely interrelated with endometrial abnormalities in AUB. Detailed testing, such as hormonal and histopathological examination, is essential in making a proper diagnosis and effective management.

Keywords: Abnormal Uterine Bleeding, Endometrial Abnormalities, Obesity, Hormonal Imbalance, Endometrial Hyperplasia, Thyroid Dysfunction, Cross-Sectional Study.

INTRODUCTION

Abnormal uterine bleeding (AUB) is one of the most frequent gynecological complaints encountered in clinical practice, affecting women across the reproductive and

perimenopausal age groups¹. It is characterized by alterations in the frequency, regularity, duration, or volume of menstrual bleeding and represents a significant cause of morbidity, reduced quality of life, and increased healthcare

utilization. AUB is especially a burden in developing countries, with the late presentation and the lack of access to diagnostic centers becoming contributory factors to the development of the disease and complications². Endometrium is a sensitive tissue that is subject to the cyclic changes in the presence of the coordinated action of estrogen and progesterone³. Estrogen will stimulate the proliferation of the endometrial lining, whereas progesterone will stabilize the lining and prepare it for eventual implantation. Any imbalance in this well-balanced hormone, especially with unbalanced exposure to estrogen, can cause excessive growth, abnormal shedding, and structural defects of the endometrium. AUB is therefore often related to a vast array of endometrial variations between normal cyclical variations and pathological alterations, including endometrial hyperplasia, polyps, chronic endometritis, and, in some instances, carcinoma⁴.

Over the recent years, metabolic factors, especially obesity, have proved to be a crucial factor in the endometrial pathology among women with AUB. Adipose tissue is a dynamic endocrine gland that converts androgens into estrogens peripherally by activating aromatase⁵. This results in chronic estrogen excess with the lack of sufficient progesterone counteraction, which predisposes to endometrial hyperplasia and long-term risk of malignancy. Moreover, insulin resistance and chronic low-grade inflammation often accompany obesity and might also impact endometrial proliferation and vascular changes⁶.

Non-ovarian axis hormonal disturbances, and in particular thyroid dysfunction, also have a leading role in AUB pathophysiology. The thyroid hormones affect the menstrual regularity by their action on gonadotropin-releasing hormone (GnRH) and ovarian activity. Hypothyroidism, especially, is usually linked to menorrhagia and endometrial thickening, whereas hyperthyroidism can result in oligomenorrhea or amenorrhea. Thus, thorough hormonal assessment is a key element in establishing the underlying etiological mechanisms of abnormal bleeding pattern^{7,8}.

Although the issue of AUB is multifactorial, the connection between endometrial abnormalities, obesity and systemic hormonal disturbances is not explored in most regional contexts, such as in Pakistan. Moreover, the differences in the clinical management between the conservative

hormonal treatment and surgical procedures reveal the necessity of enhanced knowledge of the disease patterns and outcomes of treatment in particular populations^{9,10}.

The current study was aimed at assessing the range of endometrial abnormalities in women with abnormal uterine bleeding and examining how they are related to obesity, hormonal disorders, and treatment course. This study will offer a holistic understanding of the pathophysiology and inform evidence-based management of AUB by synthesizing clinical, biochemical, and histopathological data¹¹.

MATERIALS AND METHODS

This clinical cross-sectional study was conducted in the Department of Obstetrics and Gynaecology at Sandeman Provincial Hospital over a period of 12 months, from January 2024 to January 2025. One hundred women who reported a case of abnormal uterine bleeding (AUB) were recruited through a non-probability consecutive method. The sample consisted of women aged between 18 and 55 years with complaints of abnormal menstrual bleeding in terms of frequency, duration, or quantity, and willingness to have a comprehensive clinical, hormonal, and histopathological examination. The study excluded expectant mothers, those with known coagulation disorders, patients who had previously detected endometrial carcinoma, and those who had undergone hormonal therapy in the past three months to reduce potential confounding factors.

Clinical examination of all participants was conducted based on a complete clinical assessment, with the inclusion of menstrual, obstetric, and medical history and general and pelvic examination. Anthropometric data were taken, and body mass index (BMI) was determined according to the standard WHO parameters to classify patients into normal, overweight, and obese. Laboratory tests comprised of complete blood count and hormonal analysis, namely thyroid-stimulating hormone (TSH), serum estrogen, and progesterone levels, in order to detect any existing endocrine problems. Pelvic ultrasonography was performed on all the patients in order to establish the size of the uterus, endometrial thickness, and whether patients had structural abnormalities (fibroids or polyps).

Endometrial sampling, pipelle biopsy, or dilatation and curettage (D&C) under aseptic conditions was performed based on clinical indication. The obtained specimens were sent

to the pathology department, where the endometrial patterns were classified into proliferative, secretory, hormonal imbalance, hyperplasia, inflammatory alterations, or malignant lesions. Treatment modalities were divided into medical (hormonal therapy, NSAIDs, or antifibrinolytics) and surgical (D&C, polypectomy, or hysterectomy) based on clinical findings and the results of the investigation.

Statistical Package for Social Sciences (SPSS) version 26 was used to enter and analyze all the collected data. Quantitative variables like age and BMI were reported as mean \pm standard deviation, and frequencies and percentages were reported as categorical variables. Chi-square test was used to establish relationships between endometrial abnormalities, obesity, and hormonal disturbances, and a p-value below 0.05 was deemed significant.

The institutional review board of the hospital provided ethical approval of the study, and all the procedures were carried out in line with the principles of the Declaration of Helsinki. All the

participants were informed and given written consent before they were included in the study.

RESULTS

The study involved 100 women who presented with a case of abnormal uterine bleeding. The average age of the participants was 38.9 ± 7.8 years old with the highest proportion of 44.0% in the age group of 36–45 years, 30.0% in the age group of 26–35 years, 12.0% of the patients were in the age group of 18–25 years and 14.0% in the age group. In terms of body mass index, 48.0% of the patients were obese, 32.0% were overweight and 20.0% had normal BMI, which suggests that most of the women who presented with abnormal uterine bleeding had increased body weight. Parity-wise, 62.0% of patients had a history of multiple pregnancies (also known as multiparous), and 38.0% had one pregnancy (also known as nulliparous), implying that AUB was more common among women who had already been pregnant. These demographic and clinical baseline features are summarized in Table 1.

Table 1: Demographic and Clinical Characteristics of Patients (n = 100)

Variable	Frequency (n)	Percentage (%)
Mean age (years)	38.9 \pm 7.8	
18–25 years	12	12.0%
26–35 years	30	30.0%
36–45 years	44	44.0%
46–55 years	14	14.0%
Obese (BMI \geq 30)	48	48.0%
Overweight	32	32.0%
Normal BMI	20	20.0%
Multiparous	62	62.0%
Nulliparous	38	38.0%

The evaluation of the endometrium established that there were abnormalities in 70.0% of the patients, and a normal cyclical endometrium in 30.0% of patients. The highest rate of abnormal findings was found in the hormonal imbalance (28.0%), proliferative endometrium (17.0%), and secretory endometrium (13.0%). Endometrial hyperplasia was reported in 9.0% of patients, and structural lesions, including

endometrial polyps, were reported in 7.0% and chronic endometritis in 5.0% of cases. Notably, endometrial carcinoma was detected in 2.0% of patients, which demonstrates the importance of early histopathological evaluation in AUB. These results suggest that structural causes are less common than functional abnormalities associated with hormonal imbalance. Table 2 shows the detailed histopathologic spectrum.

Table 2: Histopathological Spectrum of Endometrial Findings (n = 100)

Endometrial Pattern	Frequency (n)	Percentage (%)
Hormonal imbalance pattern	28	28.0%
Proliferative endometrium	17	17.0%
Secretory endometrium	13	13.0%
Endometrial hyperplasia	9	9.0%
Endometrial polyp	7	7.0%
Chronic endometritis	5	5.0%
Endometrial carcinoma	2	2.0%

Normal endometrium	30	30.0%
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Hormonal examination showed that 56.0% of the patients had prior hormonal imbalances, and 44.0% of the patients had normal hormonal systems. Hypothyroidism was the most frequent abnormality, appearing in 32.0% of the patients, with estrogen dominance (14.0%) and hyperthyroidism (10.0%) coming in the second and third positions. Patients who

had hormonal abnormalities tended to have abnormal endometrial results, especially the pattern of hormonal imbalance and hyperplasia, which indicated that endocrine disorders were closely related to abnormal endometrial pathology. The hormonal profile distribution is summarized in Table 3.

Table 3: Hormonal Profile of Patients (N = 100)

Hormonal Disturbance	Frequency (n)	Percentage (%)
Hypothyroidism	32	32.0%
Hyperthyroidism	10	10.0%
Estrogen dominance	14	14.0%
Normal profile	44	44.0%

There was a statistically significant relationship between endometrial hyperplasia and obesity. Of the patients who were obese, 7/48 (14.6%) had hyperplasia as compared to only 2/52 (3.8%) in the non-obese patients, with a p-value of 0.02, which shows that obesity is a major risk factor in the pathological

proliferation of the endometria. This observation justifies the contribution of excess adipose tissue to facilitating unopposed exposure to estrogen and consequent endometrial alterations. Table 4 contains the association between BMI and hyperplasia.

Table 4: Association of Obesity with Endometrial Hyperplasia

BMI Category	Hyperplasia Present	Hyperplasia Absent	p-value
Obese (n=48)	7	41	0.02
Non-obese (n=52)	2	50	

Regarding treatment patterns, the majority of patients (65.0%) were managed with medical therapy, including hormonal treatment, non-steroidal anti-inflammatory drugs, and antifibrinolytic agents, while 35.0% required surgical intervention such as dilatation and

curettage, polypectomy, or hysterectomy. Patients with structural abnormalities, hyperplasia, or malignancy were more likely to have surgical management due to the severity of underlying pathology. These outcomes of treatment are provided in Table 5.

Table 5: Treatment Patterns in Patients with AUB (n = 100)

Treatment Type	Frequency (n)	Percentage (%)
Medical management	65	65.0%
Surgical management	35	35.0%

In general, the findings indicate that abnormal uterine bleeding can be closely linked to endometrial pathology, obesity, and hormonal disturbances, with hormonal imbalance being the most prevalent underlying mechanism, and obesity is a strong risk factor for hyperplastic changes that might necessitate more aggressive treatment.

DISCUSSION

The current study is a comprehensive assessment of endometrial abnormalities in women with abnormal uterine bleeding and underscores the considerable interplay of

obesity and hormonal imbalance as well as treatment patterns. The findings indicate that 70.0% of cases had endometrial pathology, which is similar to other research in the area and other study that has been performed in AUB, with a prevalence of between 60 and 75. This is a high frequency that is clinically significant because it proves the necessity to conduct endometrial assessment for patients with abnormal bleeding regularly, particularly in the resource-abundant setting where the inability to diagnose them promptly can lead to severe outcomes^{8,9}.

The most common endometrial findings in the current study were hormonal imbalance pattern and proliferative and secretory endometrium (28.0% and 17.95%, respectively)¹⁰. This finding reinforces the already proven idea that hypothalamic-pituitary-ovarian axis dysfunction is a key factor in the pathophysiology of AUB. Anovulatory cycles, which are caused by a long-term stimulation of estrogen without the opposition of progesterone, cause irregular proliferation and breakdown of the endometrium, causing abnormal bleeding patterns. The same results have been documented in numerous studies in which the functional causes are predominant compared to structural lesions, especially in women in their reproductive age¹¹.

The prevalence of endometrial hyperplasia was found to be 9.0% among patients, but it is relatively less common; it has serious clinical implications because it may develop into endometrial carcinoma¹². The fact that the carcinoma was detected in only 2.0% of cases in this study only serves to underscore the importance of early histopathological examination in women presenting with persistent or unexplained AUB. The results are consistent with the international statistics that show that although malignancy is rare, it is an important diagnosis that cannot be overlooked, particularly in women at risk (obesity and age)¹³.

One of the strengths of the study is that it assesses the role of obesity as a risk factor for endometrial pathology¹⁴. Almost half of the study population (48.0%) was obese, and a statistically significant correlation was found between obesity and endometrial hyperplasia ($p = 0.02$). Biologically, this observation is possible, and it is supported by the available literature because adipose tissue stimulates the peripheral aromatase-induced conversion of androgens to estrogens, resulting in chronic unopposed estrogen exposure. Besides that, insulin resistance and hyperinsulinemia are linked with obesity, and they further promote endometrial proliferation via insulin-like growth factor pathways. A combination of these processes results in a pro-proliferative environment, which predisposes the endometrium to hyperplastic and neoplastic transformation¹⁴.

Hormonal abnormalities were also very common in this study, with 56.0% of patients having some abnormality, with the most common being hypothyroidism (32.0%)¹⁵. Thyroid hormones have been reported to have

effects on menstrual regulation by affecting gonadotropin secretion and ovarian activity. Hypothyroidism specifically has been linked to menorrhagia, endometrial thickening, and anovulatory cycles, which all lead to abnormal uterine bleeding. This study is in line with other works that have shown a close relationship between thyroid dysfunction and menstrual irregularities, which highlights the need to regularly check hormones in women with AUB¹⁶.

As far as management is concerned, most of the patients (65.0%) responded to a medical therapy, and 35.0% patients needed surgery¹⁷. This is indicative of contemporary clinical practice, in which conservative management is used to address functional causes, and surgical management is used to address structural abnormalities, refractory responses, or premalignant and malignant diseases. A relatively high percentage of surgical procedures in this study can be explained by late presentation and the presence of considerable structural or pathological lesions among the study population¹⁸.

The study has some limitations, though it is strong. It was also fulfilled only in one tertiary care center, thus restricting the applicability of the results to the general population¹⁹. The size of the sample is sufficient to start the analysis, but it might not be enough to obtain the complete range of uncommon endometrial pathologies. Also, the cross-sectional type is not able to provide a long-term follow-up to evaluate the lesion progress or the treatment results. It is suggested that future multicenter longitudinal study involving more participants should be conducted to confirm these observations and investigate the cause-and-effect relationships²⁰.

CONCLUSION

Endometrial abnormalities are very common in women with abnormal uterine bleeding, and are largely caused by hormonal imbalance, with obesity and endocrine disturbances playing an important role. The most prevalent underlying mechanism is the hormonal imbalance, and the risk of endometrial hyperplasia and even the malignant transformation is significantly increased by obesity. Hypothyroidism and thyroid dysfunction are significant and frequently under-identified causes of AUB. Diagnosis and proper management require early and thorough assessment, such as hormonal profiling and endometrial histopathology. A multidisciplinary approach

focusing on metabolic control, hormonal regulation, and timely intervention can significantly improve patient outcomes and reduce the risk of disease progression.

Competing Interests

The authors declare that they have no competing interests.

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Authors' Contributions

F.U., R.K., and S.E.A. contributed to study design and data acquisition.

A.M. supervised the research work and contributed to manuscript revision.

S.B. assisted in clinical data collection and patient management.

N.A. contributed to laboratory and pharmacological data interpretation.

All authors read and approved the final manuscript.

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