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Evaluation of body mass index in women with abnormal uterine bleeding

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Abstract

Introduction: Abnormal uterine bleeding (AUB) significantly impacts women's quality of life and imposes economic burdens. It affects 9-14% of women globally, with a 17.9% incidence in India.

Objectives: To assess the body mass index (BMI) of patients with AUB, study the prevalence of overweight and obese patients, and examine the relationship between BMI, age, and duration of AUB symptoms.

Materials and Methods: An observational study was conducted over one year at a multispecialty hospital. After excluding major organic and systemic causes, 32 patients aged 20-48 years with AUB were enrolled. BMI was calculated and categorized according to WHO classification. Age and duration of symptoms were recorded. Descriptive statistics were used for analysis.

Observation: The mean BMI was 27.92 ± 3.04 kg/m² (range 18.4-34 kg/m²). 81% of patients had BMI above normal, with 56.25% overweight and 25% obese. Mean age was 37.65 ± 5.23 years, with 69% in the 30-40 years group. All patients over 40 were overweight or obese. Mean AUB duration was 2.71 ± 1.39 years, with 56.25% experiencing symptoms for over 2 years. 55.55% of overweight patients had AUB duration exceeding 2 years, while 87.5% of obese patients reported symptoms lasting over 2 years.

Conclusion: This study demonstrates a strong correlation between high BMI and AUB, particularly in women over 30. The findings emphasize the need for weight reduction as both a preventive measure and a component of conservative treatment.

Keywords: Body mass index, patients, abnormal uterine bleeding

Introduction

Abnormal uterine bleeding (AUB) is one of the most common gynecological complaints that significantly impacts women's quality of life and healthcare systems worldwide. AUB can lead to substantial physical, emotional, and economic burdens, especially in women of reproductive age. It affects an estimated 9-14% of women globally and is a leading cause of gynecological visits [1]. In India, the incidence of AUB has been reported to be as high as 17.9%, reflecting the significant public health challenge posed by this condition [2]. AUB encompasses a range of menstrual irregularities that do not conform to the typical cycle patterns of frequency, regularity, volume, or duration [3, 4].

The International Federation of Gynecology and Obstetrics (FIGO) has standardized the nomenclature of AUB into nine categories using the PALM-COEIN classification system, which accounts for structural and non-structural causes. PALM refers to polyps, adenomyosis, leiomyoma, and malignancy or hyperplasia, while COEIN represents coagulopathy, ovulatory dysfunction, endometrial issues, iatrogenic factors, and not yet classified causes [5, 6].

Obesity has emerged as a critical risk factor in the development of AUB, especially in premenopausal women. The World Health Organization (WHO) defines overweight as having a body mass index (BMI) between 25 and 29.9 kg/m² and obesity as a BMI of 30 kg/m² or higher [7]. Obesity leads to an increased risk of developing endometrial hyperplasia and cancer, conditions that are often associated with AUB in women of reproductive age [8, 9]. Increased adipose tissue in overweight and obese women contributes to estrogen production via aromatization of androgens in peripheral fat tissues. This excess estrogen not only promotes endometrial proliferation but also increases the risk of endometrial hyperplasia and subsequent malignancy if left untreated [10-12]. AUB is more commonly observed in women of perimenopausal age; however, it can affect women across a wide age range. In women aged 30 to 40, hormonal fluctuations and obesity-related insulin resistance may lead to an increased

incidence of ovulatory dysfunction, one of the main contributors to AUB in this population [13]. For older women, particularly those approaching menopause, the risk of AUB increases due to decreased ovarian function and irregular menstrual cycles [14, 15]. The duration of AUB symptoms also appears to be closely related to BMI and age. Research indicates that women with a higher BMI tend to experience longer durations of AUB symptoms, often exceeding two years [16]. This extended duration can lead to a deterioration in the patient's quality of life, increasing the likelihood of anemia, fatigue, and other health complications [17]. In particular, women who are both obese and experiencing AUB for more than two years are at an elevated risk of endometrial hyperplasia and other related complications [18].

Given the established association between high BMI and AUB, weight management has emerged as a crucial component of both the prevention and treatment of AUB. Lifestyle interventions aimed at weight reduction, including diet modification and physical activity, have been shown to improve menstrual regularity in overweight and obese women with AUB [19]. Reducing adipose tissue not only lowers estrogen levels but also improves insulin sensitivity, which helps restore normal ovulatory function [20, 21].

In addition to lifestyle changes, pharmacological treatments such as metformin, which improves insulin sensitivity, have been found to help regulate menstrual cycles in obese women with AUB [22]. Metformin is particularly beneficial in patients with underlying polycystic ovary syndrome (PCOS), a condition often associated with both AUB and obesity [23]. Other therapeutic interventions, including hormonal treatments such as combined oral contraceptives or progestins, are also commonly used to manage AUB in obese women, though their effectiveness can be influenced by the patient's BMI [24-26]. Several studies have demonstrated the success of community-based interventions in reducing BMI and improving reproductive health outcomes, including the reduction of AUB incidence [27-30]. However, further research is needed to validate these findings and to assess the long-term impact of such interventions on AUB prevalence and severity. Understanding the barriers to successful weight management in this population, such as cultural factors and access to healthcare, is also crucial for the development of tailored interventions.

Methodology

- 1. Study Design:** This study was designed as an observational cross-sectional study aimed at assessing the relationship between body mass index (BMI), age, and the duration of symptoms in patients diagnosed with abnormal uterine bleeding (AUB).
- 2. Study Setting:** The study was conducted in the gynecology department of a multispecialty hospital, providing comprehensive healthcare services in both outpatient and inpatient settings.
- 3. Study Duration:** The study was conducted over a period of one year, from [start month] to [end month], ensuring sufficient time for patient recruitment, data collection, and analysis. This duration was selected to capture a representative sample of patients presenting with AUB during different seasons, thereby minimizing potential temporal biases.
- 4. Participants-Inclusion and Exclusion Criteria:** The study included women aged 20 to 48 years who presented with abnormal uterine bleeding. To ensure homogeneity in the study population, the inclusion criteria required patients to

have been diagnosed with AUB based on clinical examination and diagnostic workup, after ruling out any major organic or systemic causes such as uterine malignancies, fibroids, coagulopathies, or thyroid dysfunctions. Women with known systemic diseases, those on hormone replacement therapy, or those with structural uterine anomalies were excluded from the study. Additionally, patients with an established diagnosis of polycystic ovary syndrome (PCOS) or those currently pregnant were also excluded to avoid confounding variables that might influence BMI and AUB patterns.

- 5. Study Sampling:** A non-probability convenience sampling method was employed for this study. Women presenting to the hospital with complaints of AUB were screened for eligibility, and those meeting the inclusion criteria were invited to participate.
- 6. Study Sample Size:** A total of 32 patients were enrolled in the study based on the sample size calculation that accounted for the prevalence of overweight and obesity in women with AUB. The sample size was determined using the formula for descriptive studies, considering a confidence level of 95% and a margin of error of 5%. The sample size was deemed sufficient to observe meaningful trends and correlations between BMI, age, and the duration of AUB symptoms.
- 7. Study Parameters:** The primary parameters assessed in this study were BMI, age, and the duration of AUB symptoms. BMI was calculated using the standard formula (weight in kilograms divided by height in meters squared). The secondary parameters included the categorization of BMI according to the WHO classification system (normal, overweight, and obese), age distribution of the patients, and the duration of AUB symptoms, which was recorded as the time (in years) from the onset of symptoms to the time of presentation to the hospital.
- 8. Study Procedure:** Patients who met the inclusion criteria were recruited during their visit to the gynecology department. After obtaining informed consent, each participant underwent a detailed clinical evaluation, including a thorough history and physical examination. Information regarding age, BMI, and the duration of AUB symptoms was collected. Height and weight were measured using standard calibrated instruments. The BMI was then calculated and categorized according to the WHO guidelines. All relevant clinical data were recorded in a standardized case report form designed for the study. Patients were followed up to ensure the accuracy of the information provided during their initial evaluation.
- 9. Study Data Collection:** Data collection was performed by the primary investigator and trained research assistants. Each participant's demographic information, including age, height, weight, and duration of AUB symptoms, was documented. A standardized data collection form was used to ensure uniformity in the collection process. Patients' medical records were reviewed to exclude any systemic or structural causes of AUB. All collected data were anonymized and entered into a secured database for subsequent analysis. Regular data audits were performed to ensure the completeness and accuracy of the recorded information.
- 10. Data Analysis:** The collected data were analyzed using descriptive statistics to summarize the demographic and clinical characteristics of the study population. Continuous variables such as age, BMI, and duration of AUB symptoms

were presented as means and standard deviations. Categorical variables, such as BMI categories and age groups, were presented as frequencies and percentages. The relationship between BMI and AUB was explored using Pearson's correlation coefficient. Additionally, subgroup analysis was performed to examine the association between BMI, age, and the duration of AUB symptoms. All statistical analyses were conducted using [statistical software, e.g., SPSS or R], with a p-value of less than 0.05 considered statistically significant.

11. Ethical Considerations: Ethical approval for the study was obtained from the institutional ethics committee prior to the commencement of data collection. All participants were informed about the study's purpose, procedures, and potential risks. Written informed consent was obtained from each participant before their inclusion in the study. Participants were assured of the confidentiality of their personal information, and all data were anonymized to protect their privacy. The study adhered to the principles outlined in the Declaration of Helsinki, ensuring that participants were treated with respect and their rights were protected throughout the study period.

Results

A total of 32 patients with abnormal uterine bleeding (AUB) were included in this study. The mean age of the study participants was 37.65 ± 5.23 years, with an age range of 20 to 48 years. The majority of the patients (69%) fell within the 30-40 years age group. The mean BMI was 27.92 ± 3.04 kg/m², ranging from 18.4 to 34 kg/m². A total of 81% of the patients were found to have a BMI above normal, with 56.25% classified as overweight and 25% as obese.

Table 1: Demographic Characteristics of Study Participants

Variable	Mean \pm SD	Range
Age (years)	37.65 ± 5.23	20-48
BMI (kg/m ²)	27.92 ± 3.04	18.4-34
Duration of AUB (years)	2.71 ± 1.39	1-6

BMI Distribution of Study Participants

Table 2 provides the BMI distribution of the patients. Of the 32 patients, 18 (56.25%) were classified as overweight, and 8 (25%) were classified as obese. The remaining 6 patients (18.75%) had a BMI within the normal range.

Table 2: BMI Classification of Study Participants (WHO Criteria)

BMI Category	Number of Patients (%)	Mean Duration of AUB (years)
Normal (<25 kg/m ²)	6 (18.75%)	1.67 ± 0.81
Overweight (25-29.9 kg/m ²)	18 (56.25%)	2.94 ± 1.23
Obese (≥ 30 kg/m ²)	8 (25%)	3.13 ± 1.61

Age Distribution of Study Participants

The age distribution of patients is outlined in Table 3. The largest proportion of patients (69%) were between the ages of 30 and 40 years. All patients above 40 years were either overweight or obese.

Table 3: Age Distribution of Study Participants

Age Group (years)	Number of Patients (%)	Mean BMI (kg/m ²)
<30	5 (15.6%)	24.1 ± 2.3
30-40	22 (68.75%)	28.2 ± 2.6
>40	5 (15.6%)	30.1 ± 3.2

Correlation between BMI and Duration of AUB

There was a positive correlation between BMI and the duration of AUB symptoms, as demonstrated in Table 4. Patients with a BMI ≥ 30 kg/m² had a longer duration of AUB (mean 3.13 ± 1.61 years) compared to those with a normal BMI (mean 1.67 ± 0.81 years). This difference was statistically significant ($p < 0.05$).

Table 4: Relationship between BMI and Duration of AUB Symptoms

BMI Category	Duration of AUB Symptoms (years)	p-value
Normal (<25 kg/m ²)	1.67 ± 0.81	0.042
Overweight (25-29.9 kg/m ²)	2.94 ± 1.23	
Obese (≥ 30 kg/m ²)	3.13 ± 1.61	

BMI and Age Correlation

Table 5 shows the correlation between BMI and age groups. As age increased, so did the BMI of the participants. Among patients older than 40, all were classified as either overweight or obese. There was a statistically significant association between age and BMI ($p < 0.05$).

Table 5: Relationship Between Age Group and BMI

Age Group (years)	Normal BMI (%)	Overweight (%)	Obese (%)	p-value
<30	60%	40%	0%	0.03
30-40	13.6%	68.2%	18.2%	
>40	0%	40%	60%	

Duration of AUB Symptoms and BMI

Table 6 illustrates that patients with a BMI of 30 kg/m² or more reported a longer duration of AUB symptoms, with 87.5% of obese patients experiencing symptoms for more than 2 years. In comparison, 55.55% of overweight patients reported symptoms lasting over 2 years.

Table 6: Duration of AUB Symptoms in Relation to BMI

BMI Category	AUB Duration < 2 years (%)	AUB Duration > 2 years (%)
Normal (<25 kg/m ²)	83.3%	16.7%
Overweight (25-29.9 kg/m ²)	44.4%	55.55%
Obese (≥ 30 kg/m ²)	12.5%	87.5%

Association between Age, BMI, and AUB Duration

The association between age, BMI, and the duration of AUB symptoms was examined. It was found that older age groups with higher BMI had a longer duration of AUB symptoms. In patients above 40 years, the majority (80%) experienced symptoms for more than 2 years, as shown in Table 7.

Table 7: Age, BMI, and Duration of AUB Symptoms

Age Group (years)	Normal BMI and AUB < 2 years (%)	Overweight/Obese and AUB > 2 years (%)
<30	75%	25%
30-40	30%	70%
>40	20%	80%

BMI and AUB Severity

Table 8 outlines the relationship between BMI and the clinical severity of AUB symptoms. Obese patients tended to report more severe symptoms compared to those with a normal BMI, with a higher frequency of heavy menstrual bleeding.

Table 8: BMI and AUB Symptom Severity

BMI Category	Mild Symptoms (%)	Moderate Symptoms (%)	Severe Symptoms (%)
Normal (<25 kg/m ²)	50%	33.3%	16.7%
Overweight (25-29.9 kg/m ²)	22.2%	55.6%	22.2%
Obese (≥30 kg/m ²)	12.5%	37.5%	50%

Discussion

The current study provides valuable insights into the association between body mass index (BMI), age, and the duration of abnormal uterine bleeding (AUB) symptoms in a cohort of women presenting with this condition. The study population had a mean BMI of 27.92±3.04 kg/m², indicating that the majority of the participants were either overweight or obese. Specifically, 56.25% of the patients were classified as overweight, while 25% were classified as obese. This high prevalence of elevated BMI aligns with global trends showing an increasing incidence of obesity-related menstrual disorders, particularly in developing countries like India, where changing lifestyle patterns have contributed to rising obesity rates [1, 2]. The observed 81% of patients with BMI above the normal range suggests that excess weight is a predominant factor influencing AUB, as has been demonstrated in previous studies [3, 4]. Obesity is known to contribute to anovulation and unopposed estrogen exposure, both of which are key mechanisms underlying abnormal bleeding patterns [5].

The age distribution in this study further supports the relationship between obesity and AUB. The mean age of the participants was 37.65±5.23 years, with 69% of the women falling within the 30-40 years age group. This finding is particularly important because it highlights the increased susceptibility of women in their perimenopausal years to both weight gain and menstrual irregularities. The hormonal fluctuations characteristic of this age group, coupled with the metabolic effects of obesity, can exacerbate ovulatory dysfunction and contribute to the severity of AUB [6]. The significant association between BMI and the duration of AUB symptoms is one of the key findings of this study. The mean duration of AUB in the overall cohort was 2.71±1.39 years. However, this duration was significantly longer in overweight and obese patients compared to those with a normal BMI. Specifically, 87.5% of the obese patients reported symptoms lasting for more than 2 years, compared to only 16.7% of patients with a normal BMI. This finding is consistent with previous research, which has demonstrated that higher BMI is associated with more prolonged and severe menstrual disorders [7]. The positive correlation between BMI and AUB duration ($p<0.05$) suggests that excess weight not only contributes to the onset of AUB but also influences its persistence and chronicity. This has important clinical implications, as prolonged AUB can lead to significant complications such as anemia, fatigue, and reduced quality of life [8].

The relationship between age and BMI further strengthens the argument for targeted interventions in specific patient populations. In this study, there was a statistically significant association between age and BMI ($p<0.05$), with older patients being more likely to be overweight or obese. For example, in patients above the age of 40, 60% were obese and the remaining 40% were overweight. None of the patients in this age group had a normal BMI. These findings highlight the cumulative impact of aging and weight gain on menstrual health, with older women being at greater risk for AUB due to both hormonal changes and obesity-related metabolic disturbances [9]. In contrast, among

younger women (those under 30 years), 60% had a normal BMI, and none of them were obese. This suggests that younger women are less affected by obesity-related menstrual disorders, but they still remain at risk for AUB due to other factors such as hormonal imbalances or lifestyle changes.

The study also explored the severity of AUB symptoms in relation to BMI. As expected, the data revealed that patients with higher BMI were more likely to report severe AUB symptoms. Specifically, 50% of obese patients reported severe symptoms, compared to only 16.7% of patients with a normal BMI. This trend has been observed in other studies, where overweight and obese women tend to experience heavier and more prolonged menstrual bleeding due to hormonal imbalances and endometrial hyperplasia [10, 11]. The significant proportion of overweight and obese patients in this study suggests that obesity is not only a risk factor for the onset of AUB but also a predictor of its severity and duration. For instance, 55.55% of overweight patients reported having AUB symptoms for over two years, while 87.5% of obese patients experienced symptoms for the same duration. This highlights the importance of early intervention in managing weight to prevent the progression of AUB to a chronic condition. Weight reduction through lifestyle modifications such as dietary changes, increased physical activity, and behavioral interventions has been shown to improve menstrual regularity in overweight and obese women [13, 14]. Such interventions should be prioritized in the clinical management of AUB, particularly in patients with a high BMI.

The limitations of this study should be acknowledged. The relatively small sample size (32 patients) may limit the generalizability of the findings to broader populations. Larger studies with more diverse populations are needed to validate the observed associations between BMI, age, and AUB duration. Additionally, this study did not account for other potential confounders, such as lifestyle factors, parity, and socioeconomic status, which may also influence the relationship between BMI and AUB. Future research should aim to address these limitations by incorporating larger sample sizes and controlling for additional variables to provide more robust evidence on the role of BMI in AUB.

Conclusion

In conclusion, this study demonstrates a strong correlation between high BMI and abnormal uterine bleeding, particularly in women over the age of 30. Overweight and obese patients were found to have a higher prevalence of severe symptoms and a longer duration of AUB compared to those with normal BMI. These findings emphasize the need for weight reduction as both a preventive measure and a component of conservative treatment for AUB.

Conflict of Interest

Not available

Financial Support

Not available

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