ASSOCIATION OF ABNORMAL UTERINE BLEEDING WITH BODY MASS INDEX AMONG WOMEN ATTENDING GYNAECOLOGY OUTPATIENT DEPARTMENT, PURNEA, BIHAR.

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ABSTRACT
Background
Abnormal uterine bleeding (AUB) is a general gynecological condition that significantly affects women's health and quality of life. Body mass index (BMI) is a well-established factor influencing reproductive health, and its impact on AUB has been observed but not extensively studied in low-resource settings. This study aims to examine the association between BMI and AUB among women attending the gynecology OPD.

Methods
A total of 144 women were included based on specific inclusion and exclusion criteria. Data were collected on socio-demographic parameters, menstrual history, obstetric history, and BMI. BMI was calculated and categorized according to the World Health Organization (WHO) classification. The prevalence of AUB was determined across different BMI categories, and statistical analysis was accomplished using SPSS version 23.0.

Results
The study found that 54.9% of participants had AUB. Obese women had the highest incidence of AUB (73.7% in obese class I and 100% in obese class II and III), with a substantial relationship between higher BMI and increased AUB prevalence ($p < 0.05$). Obesity was also associated with higher rates of ovulatory dysfunction (32.4%) and iatrogenic causes of AUB. The prevalence of heavy menstrual bleeding and irregular periods was notably higher in women with higher BMI categories.

Conclusion
There is a significant association between higher BMI and increased incidence of AUB among women attending the gynecology OPD. These findings suggest that obesity is a critical factor contributing to menstrual irregularities and AUB, underscoring the need for targeted interventions in this population.

Recommendations
Comprehensive AUB care should include BMI testing in routine gynecological exams and weight management counseling. More study is needed to understand the processes between BMI and AUB and create customized therapies for obesity-related menstrual problems.

Introduction

Women of reproductive age are frequently affected by abnormal uterine bleeding (AUB), a gynecological disorder that has a substantial impact on their well-being, quality of life, and health. AUB includes a variety of symptoms that might arise from several underlying reasons, such as irregularities in the length, volume, and regularity of the menstrual cycle. The PALM-COEIN system, which includes non-structural causes like coagulopathy, ovulatory disorders, endometrial factors, iatrogenic factors, and not yet classified causes (COEIN) as well as structural causes like polyps, adenomyosis, leiomyomas, and malignancy (PALM), has been used by the International Federation of Gynaecology and Obstetrics (FIGO) to classify AUB into nine categories [1]. By assisting clinicians in identifying and treating the particular etiology of AUB, this classification has made it easier to comprehend and manage the condition.

A key measure of body fat, body mass index (BMI) is frequently used to categorize people as underweight, normal weight, overweight, or obese. Numerous research studies have demonstrated that body mass index (BMI) has a noteworthy impact on both menstrual health and gynecological results [2, 3]. Due to its impact on hormone balance and metabolism, obesity in particular has been linked to a raised risk of menstrual abnormalities and AUB [4]. Elevated BMI has been linked to hyperestrogenism, insulin resistance, and chronic inflammation. These conditions have been shown to interfere with regular endometrial function and raise the risk of AUB [5]. On the other hand, low BMI has also been connected to irregular menstruation, albeit via distinct pathways such as lowered estrogen levels and hypoestrogenic conditions [6].

Despite the established associations between BMI and reproductive health, there is limited data on the specific

relationship between BMI and AUB among women attending gynecology outpatient departments (OPDs) in tertiary care settings, especially in low-resource settings like India. Understanding this relationship is essential for developing targeted interventions that can improve clinical outcomes for women experiencing AUB. Additionally, examining the sociodemographic and clinical profiles of these women can provide insights into the risk factors associated with AUB and inform comprehensive management strategies.

The present study aims to examine the association between BMI and AUB among women attending the gynecology OPD.

METHODOLOGY
Study Design
A cross-sectional study.

Study Setting
The study took place over a period from August 2023 to August 2024 at the Department of Obstetrics & Gynaecology, Fatma Hospital, Purnea, Bihar, India.

Participants
A total of 144 females were included in the study.

Inclusion Criteria
- Women aged between 18 and 60 years.
- Women who have not undergone recent hormone therapy or surgery affecting menstrual bleeding in the past three months.
- Women with no history of malignancy or other serious systemic illnesses that could affect the study outcomes.

Exclusion Criteria
- Pregnant women or women with suspected pregnancy-related causes of bleeding.
- Women with acute or chronic infections that could potentially influence bleeding patterns or BMI.
- Women who have undergone recent major surgery affect the reproductive system or overall health.

Bias
To minimize selection bias, all eligible participants who met the inclusion criteria and provided consent during the study period were enrolled. Recall bias was minimized by obtaining detailed medical histories through structured interviews conducted by trained personnel.

Variables
BMI, classified according to the World Health Organisation (WHO) categorization into underweight (BMI <18.4 kg/m²), normal weight (BMI 18.5–24.9 kg/m²), overweight (BMI 25.0–29.9 kg/m²), and obese (Obesity Class I (30.0–34.9 kg/m²), II (35.0–39.9 kg/m²), and III (≥40.0 kg/m²)), as well as the existence of AUB, were the variables considered.

Data Collection
The collection of data was conducted using structured interviews, clinical examinations, and laboratory investigations. Details on socio-demographic characteristics, menstrual history, and obstetric history were documented.

Relevant blood tests, including an anaemia profile, thyroid profile, and coagulation profile, were performed. A urine pregnancy test was conducted as necessary to eliminate bleeding of pregnancy-related origin. The diagnosis and categorization of AUB were established using clinical history, and physical examination, following the PALM-COEIN approach. Diagnostic endometrial biopsy was conducted in circumstances where it was necessary.

Procedure
A comprehensive medical history was obtained, and systematic physical examinations were conducted. Appropriate laboratory tests were performed, and the diagnosis of AUB was confirmed. The body weight was quantified in kilograms using a balance beam scale, while the height was measured in meters using a vertical measuring scale that was connected thereto. Each participant's BMI was determined by dividing their weight in kilograms by the square of their height in meters. Subjects were classified into various BMI categories based on the WHO classification model.

Statistical Analysis
Statistical data were methodically documented in an MS Excel spreadsheet and examined using SPSS version 23.0. Summary statistics, such as percentages and frequencies, were computed to provide a numerical summary of the data. The Z-test for proportions was employed to ascertain the statistical significance of the difference between groups.

Ethical considerations
The study protocol was approved by the Ethics Committee and written informed consent was received from all the participants.

RESULTS
Out of the 144 women included in the study, the majority (58.3%) were between the ages of 31 and 50 years. The mean age of the participants was 39.2 years (± 9.3 years). Socio-demographically, 62.5% of the women belonged to a middle socioeconomic class, 24.3% to a lower socioeconomic class, and 13.2% to an upper socioeconomic class. The mean age at menarche was 13.5 years (± 1.2 years). The participants were categorized according to their BMI based on the WHO classification:

Table 1: Distribution of Participants by BMI Category

BMI Category	Number of Participants (n = 144)	Percentage (%)
Underweight	15	10.4
Normal Weight	54	37.5
Overweight	48	33.3
Obese Class I	19	13.2
Obese Class II	6	4.2
Obese Class III	2	1.4

Among the participants, 79 (54.9%) were diagnosed with AUB, while 65 (45.1%) had no abnormal bleeding patterns. The incidence of AUB was examined across different BMI categories.

The types of AUB were categorized into ovulatory dysfunction (AUB-O), endometrial (AUB-E), iatrogenic (AUB-I), not otherwise classified (AUB-N), and polyps (AUB-P). The distribution of these types across BMI categories is shown in Table 2:

Table 2: Distribution of AUB Types by BMI Category

BMI Category	Frequency	AUB-O (%)	AUB-E (%)	AUB-I (%)	AUB-N (%)	AUB-P (%)
Underweight	12	2 (16.7)	3 (25.0)	0 (0.0)	7 (58.3)	0 (0.0)
Normal Weight	46	5 (10.9)	8 (17.4)	3 (6.5)	26 (56.5)	4 (8.7)
Overweight	49	7 (14.3)	12 (24.5)	5 (10.2)	19 (38.8)	6 (12.2)
Obese	37	12 (32.4)	10 (27.0)	8 (21.6)	4 (10.8)	3 (8.1)
Total	**144**	**26 (18.1)**	**33 (22.9)**	**16 (11.1)**	**56 (38.9)**	**13 (9.0)**

From Table 2, it is evident that the prevalence of ovulatory dysfunction (AUB-O) was highest among obese participants (32.4%). In contrast, the not otherwise classified group (AUB-N) was most prevalent among those with normal weight (56.5%).

A statistically significant association was found between BMI categories and types of AUB ($p < 0.05$).

Specifically, women in the obese category showed a significantly higher prevalence of ovulatory dysfunction and iatrogenic causes, whereas normal weight women predominantly had AUB-N.

The study demonstrated a substantial correlation between BMI and the occurrence of AUB. The prevalence of AUB increased with higher BMI categories.

Table 3: Association Between BMI and AUB

BMI Category	Number of Women with AUB	Percentage with AUB (%)	Z-Test (p-value)
Underweight	6	40.0	0.044*
Normal Weight	21	38.9	0.035*
Overweight	30	62.5	0.002**
Obese Class I	14	73.7	<0.001**
Obese Class II	6	100.0	<0.001**
Obese Class III	2	100.0	<0.001**

$*p < 0.05, **p < 0.01$

Detailed menstrual histories were collected for women diagnosed with AUB. The following table summarizes the distribution of menstrual characteristics in these women:

Table 4: Menstrual Characteristics in Women with AUB

Menstrual Characteristic	Number of Women (n = 79)	Percentage (%)
Duration of Menstrual Flow		
- 1–3 Days	18	22.8
- 4–6 Days	45	57.0
- >6 Days	16	20.2
Amount of Menstrual Flow		
- Normal	30	38.0
- Heavy	49	62.0
Frequency of Periods		
- Regular (21–35 days)	35	44.3
- Irregular (>35 days or <21 days)	44	55.7
Association with Pain (Dysmenorrhea)		
- Present	28	35.4
- Absent	51	64.6

Obstetric history was evaluated to explore potential correlations with AUB. Parity and time since last delivery were noted, as shown in the table 5:

Table 5: Obstetric History in Women with AUB

Obstetric History	Number of Women (n = 79)	Percentage (%)
Parity		
- Nulliparous	15	19.0
- Primiparous	23	29.1
- Multiparous	41	51.9
Time Since Last Delivery		
- <1 Year	10	12.7
- 1–3 Years	26	32.9
- >3 Years	43	54.4

The statistical analysis indicated a substantial correlation between higher BMI and increased prevalence of AUB. The Z-test for proportions demonstrated that women in the overweight and obese categories had significantly higher rates of AUB compared to those in the normal and underweight categories ($p < 0.05$). Additionally, a strong correlation was found between the amount of menstrual flow and BMI, with women in the higher BMI categories more likely to report heavy menstrual bleeding ($p < 0.01$).

DISCUSSION

The study examined the relationship between BMI and AUB in women who were admitted to a tertiary care hospital's gynecology ward and those who visited the gynecology outpatient department. The majority of participants, who were mostly women from the middle socioeconomic class, were between the ages of 31 and 50. The participants' average age was 39.2 years, and their average menarche age was 13.5 years. 10.4% of participants were underweight, 37.5% were normal weight, 33.3% were overweight, and 19% were obese (obesity classes I, II, and III) according to the distribution of people across BMI categories.

The types of AUB varied significantly across BMI categories. Obese participants showed the highest prevalence of ovulatory dysfunction (AUB-O) at 32.4%, whereas normal-weight participants had the highest prevalence of AUB not otherwise classified (AUB-N) at 56.5%. The statistical analysis revealed a significant association between BMI categories and types of AUB ($p < 0.05$), with a higher likelihood of certain AUB types such as ovulatory dysfunction and iatrogenic causes in the obese group.

The prevalence of AUB among the participants was 54.9%, with a significant increase in AUB rates observed in higher BMI categories. Specifically, 40% of underweight women, 38.9% of women with normal weight, 62.5% of overweight women, and 73.7% of women in the obese class I category reported AUB. The prevalence was 100% in women in the obese classes II and III categories. Statistical analysis using the Z-test for proportions indicated a significant association between BMI and AUB, with higher BMI categories being strongly correlated with an increased prevalence of AUB ($p < 0.05$).

In addition to BMI, the study examined menstrual characteristics among women diagnosed with AUB. Most women with AUB reported a menstrual flow duration of 4–6 days (57%), heavy menstrual flow (62%), and irregular periods (55.7%). Furthermore, the prevalence of dysmenorrhea was noted in 35.4% of women with AUB. The data also showed that multiparous women (51.9%) were more likely to report AUB compared to nulliparous (19%) and primiparous women (29.1%). These findings suggest that AUB is not only associated with increased BMI but also with various menstrual and obstetric factors.

Overall, the study highlights a strong link between higher BMI and the prevalence of AUB among women. The significant association suggests that obesity could be a key factor contributing to menstrual irregularities and abnormal bleeding patterns. These findings emphasize the importance of addressing BMI in the management and prevention of AUB in clinical practice. Furthermore, the study underscores the need for comprehensive gynecological assessments that include BMI evaluation, menstrual history, and obstetric history to better understand and manage AUB in women.

In a study, women between the ages of 18 and 45 had their BMI and triponderal mass index (TMI) compared with AUB. The existence of acute or chronic AUB was not significantly correlated with either BMI or TMI, according to the study [7]. High BMI and abnormal uterine hemorrhage were found to be significantly correlated in another investigation that examined patients' BMIs. A BMI above normal was present in more than 81% of the patients, suggesting that weight loss is necessary as a preventive intervention [8].

Furthermore, in premenopausal women with AUB, a study assessed the relationship between BMI and endometrial pathology and discovered that elevated BMI is a substantial risk factor for endometrial hyperplasia with atypia, a precursor to endometrial cancer [9]. According to a prospective study, dietary counseling and lifestyle changes can help reduce the occurrence of menstrual abnormalities linked to high BMI. The study also indicated that BMI is important in regulating the menstrual cycle [10].

In premenopausal women with AUB, a study examined which risk factor—age or BMI—is more important for endometrial hyperplasia/malignancy. It was determined that when determining the likelihood of endometrial hyperplasia/malignancy, elevated BMI may be more predictive than age [11]. Moreover, a systematic review and meta-analysis that looked at the relationship between obesity and the risk of uterine fibroids (UFs) discovered that there is a non-linear rise in both the risk and prevalence of UFs in obese people [12].

In a prospective study, endometrial pathology and abnormal uterine bleeding were found to be significantly correlated with obesity and hypertension [13]. The study also examined histological abnormalities in the endometrium of individuals with AUB. Increased waist-to-hip ratio and BMI are linked to higher risks of reproductive problems, including irregular uterine bleeding, according to Mendelian randomization research [14]. This suggests that these correlations may have hereditary roots. According to a study, endometrial thickness, dysmenorrhea, and BMI all have a major impact on the ability to diagnose abnormal uterine bleeding when combined with vaginal ultrasonography and bleeding pattern [15].

Generalizability

The generalizability of the study findings is limited by its small sample size (144 women) and single-site setting, which may not represent broader populations. Since the study focuses on a specific low-resource group, its applicability to other settings, including higher-resource areas, may be restricted. Additionally, factors beyond BMI, like diet or genetics, were not thoroughly explored, further limiting the external validity. More research across diverse populations is needed before widely applying the findings.

CONCLUSION

The study found that women with higher BMI, particularly those classified as overweight or obese, are at a significantly greater risk of experiencing AUB. The results suggest that obesity is a key factor associated with increased menstrual irregularities and abnormal uterine bleeding. These findings underscore the importance of monitoring BMI as part of the clinical assessment for women presenting with AUB in gynecological settings.

Limitations

The limitations of this study include a small sample population who were included in this study. Furthermore, the lack of a comparison group also poses a limitation for this study's findings.

Recommendation

Healthcare providers should incorporate BMI assessment into routine gynecological evaluations and provide counseling on weight management as part of the comprehensive care for women with AUB. Further research is recommended to explore the underlying mechanisms linking BMI and AUB and to develop tailored interventions for women with obesity-related menstrual disorders.

List of abbreviations

AUB - Abnormal Uterine Bleeding
BMI - Body Mass Index
WHO - World Health Organization
SPSS - Statistical Package for the Social Sciences
FIGO - International Federation of Gynaecology and Obstetrics
PALM-COEIN - Polyps, Adenomyosis, Leiomyomas, Malignancy (PALM); Coagulopathy, Ovulatory Disorders, Endometrial Factors, Iatrogenic Causes, Not Yet Classified (COEIN)
OPD - Outpatient Department
AUB-O - Ovulatory Dysfunction
AUB-E - Endometrial
AUB-I - Iatrogenic
AUB-N - Not Otherwise Classified
AUB-P - Polyps
TMI - Triponderal Mass Index

Conflict of interest

The authors have no conflicting interests to declare.

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