Original Research Article

Examining the association between body mass index and abnormal uterine bleeding: a cross-sectional study among women in a tertiary care gynaecology outpatient setting

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ABSTRACT

Background: This study examines body mass index (BMI) and abnormal uterine bleeding (AUB) in tertiary care hospital gynaecology outpatients. The findings will improve resource-limited AUB management practices.
Methods: At Rajendra Institute of Medical Science in Ranchi, India, 100 women aged 18-60 attended the gynaecology outpatient department for this cross-sectional study. Clinical assessments, BMI measurements and PALM-COEIN-based diagnostic techniques classified abnormal uterine bleeding (AUB) categories in participants.
Results: Higher BMI categories were associated with more AUB, according to the study. Obese women had the greatest AUB rate (83.3%), followed by overweight (66.7%). Obese subjects had the highest AUB-related ovulatory dysfunction. Women with higher BMI had more frequent heavy menstrual flow (p<0.01).
Conclusions: Elevated BMI is strongly associated with an increased prevalence of abnormal uterine bleeding, particularly in overweight and obese women.

Keywords: Abnormal uterine bleeding, Body mass index, Gynecology, Ovulatory dysfunction, Obesity

INTRODUCTION

Abnormal uterine bleeding (AUB) is a common condition that significantly impacts women during their reproductive years. This significantly impacts their overall quality of life, mental well-being and physical health. Menstrual irregularities that deviate from standard patterns regarding volume, frequency or duration are classified as AUB. These disruptions often lead to a range of challenges, including anaemia, fatigue and psychological distress, underscoring the condition's considerable effect on daily activities. The PALM-COEIN categorisation system was developed by the International Federation of Gynaecology and Obstetrics (FIGO) to streamline the diagnosis and management of AUB. This widely utilised framework categorises abnormal uterine bleeding into nine etiological groups by distinguishing between structural causes, such as polyps, adenomyosis, leiomyomas and malignancy or hyperplasia (PALM) and non-structural causes, which include coagulopathy, ovulatory dysfunction, endometrial factors, iatrogenic influences and unexplained or other factors (COEIN). This systematic approach allows for the identification of underlying reasons and the development of personalised treatment plans, demonstrating significant advantages for healthcare professionals.[1-3]

BMI, a common measure of body fat based on height and weight, is important for reproductive health. The WHO classifies people as underweight, normal weight, overweight and obese. BMI reflects dietary and metabolic factors, which affect menstrual health. BMI affects menstrual cycles and increases the incidence of gynaecological diseases, including AUB.[4-8] AUB and irregular menstruation are strongly linked to obesity.

Oestrogen levels rise due to excess body fat, causing hyperestrogenism. Endometrial hyperplasia and irregular ovulation, which often precede AUB, result from this hormonal disruption. Endometrial function is harmed by metabolic disorders like insulin resistance and chronic inflammation caused by obesity. Low-BMI women are more likely to have hypoestrogenic situations due to insufficient body fat for hormone synthesis. Anovulation and endometrial atrophy cause irregular or scant menstruation. BMI's complex relationship with menstrual health highlights its importance in gynaecological evaluations.

Research investigating the specific relationship between BMI and AUB in low-resource countries, such as India, is significantly limited, despite the established links between BMI and menstrual health. Women in these regions often face challenges in accessing healthcare and there is limited understanding of their specific sociodemographic and clinical characteristics. This disparity is concerning as resource-poor environments often exhibit elevated obesity rates due to lifestyle changes, urbanisation and limited access to nutritional education and interventions. Low BMI resulting from undernutrition in certain populations exacerbates the spectrum of irregular menstruation. The relationship between AUB and BMI is analysed in women visiting gynaecology outpatient departments at a tertiary care hospital. This study investigates the relationship between BMI and menstrual health to elucidate the impact of body weight on gynaecological disorders. The sociodemographic and clinical characteristics of these women will aid in identifying risk factors and inform targeted interventions.

This study could improve clinical results by helping resource-limited healthcare professionals design AUB management strategies. It also emphasises BMI as a controllable risk factor, enabling integrated menstrual health treatments in varied populations.

METHODS

Study design

This was a cross-sectional study designed to evaluate the relationship between BMI and abnormal uterine bleeding (AUB).

Study setting

This investigation was carried out in the Department of Obstetrics and Gynaecology at Rajendra Institute of Medical Science, Ranchi, over a period of one year, from September 2022 to August 2023.

Study population

The research included a total of 100 female participants who met the eligibility criteria.

Inclusion criteria

The study included women aged between 18 and 60 years who visited the gynecology outpatient department and had no recent history of hormone therapy or surgical interventions affecting menstrual bleeding within the last three months. Participants were also required to have no history of malignancies or severe systemic illnesses that could impact the study outcomes.

Exclusion criteria

Pregnant women or those with pregnancy-related bleeding causes were excluded. Additionally, women with acute or chronic infections influencing bleeding patterns or BMI and those who had undergone major surgeries affecting reproductive or general health, were not considered eligible for the study.

Study method

The participants underwent a medical history review, physical exam and lab tests. A precision balancing beam scale measured body weight, while a vertical stadiometer recorded height. BMI is calculated by dividing weight in kilogrammes by height in metres squared. Based on BMI, WHO classified people as underweight, normal, overweight and obese. Patients having a BMI of 18.5 to 24.9 kg/m² were considered normal weight, while those below 18.5 kg/m² were underweight. People with a BMI of 25-29.9 kg/m² were deemed overweight. Obese patients had BMIs above this and were split into classes I, II and III. The cohorts had BMIs ranging from 30.0 to 34.9 kg/m², 35.0 to 39.9 kg/m² and ≥40.0 kg/m PALM-COEIN classified abnormal uterine bleeding by structural and non-structural sources. Endometrial samples were used to research pathology and improve diagnosis when clinical results warranted more research. This rigors approach ensured thorough and uniform evaluation, simplifying clinical classification and analysis.

Data collection

Information on socio-demographic details, menstrual history and obstetric history was collected through structured interviews. Clinical examinations and laboratory investigations were conducted, including tests for anemia, thyroid function, coagulation profile and pregnancy when required, to rule out bleeding related to pregnancy.

Statistical analysis

The data were organized in a Microsoft Excel spreadsheet and processed using SPSS software version 23.0. Descriptive analysis, encompassing frequencies and percentages, was employed to summarize the dataset. To assess the statistical significance of differences between groups, the Z-test for proportions was utilized.

RESULTS

The average age of the 100 women in the study was 39.2 years (±9.3 years), with 58% aged 31-50. Participants were 63% middle class, 25% lower class and 12% upper class. Menarche averaged 13.5 years, with a 1.2-year standard deviation. About 45% of the participants had no abnormal bleeding patterns, while 55% had AUB (Table 1). AUB was characterised as ovulatory dysfunction (AUB-O), endometrial (AUB-E), iatrogenic (AUB-I), not otherwise classified (AUB-N) and polyps.

Table 2 shows BMI distribution. Ovulatory dysfunction (AUB-O) was most common in obese people at 50% and AUB-N in normal weighers at 47.6%. A substantial connection (p<0.05) was seen between AUB kinds and BMI categories. AUB rates were highly connected with BMI, with higher BMI categories having higher AUB rates. Compared to 66.7% overweight, 60.0% underweight and 55.3% normal BMI women, 83.3% obese women reported AUB (p<0.001). Data shows a substantial rise in AUB prevalence (p < 0.05) with increasing BMI (Table 3). In a study of 55 women with abnormal uterine bleeding (AUB), 54.5% had periods of four to six days and 23.6% had periods longer than six days. 56.4% had irregular periods, whereas 61.8% had heavy periods. 34.5% of women had dysmenorrhea, whereas 65.5% reported no pain. In AUB patients, prolonged, heavy and irregular bleeding patterns are more common (Table 4). Obstetric analysis showed that most AUB patients (n=55) were multiparous (54.5%), followed by primiparous (27.3%) and nulliparous (18.2%). Table 5 shows that 58.2% of women had birth more than three years ago, 32.7% during one to three years and 9.1% within one year.

Table 1: Classification of participants according to the WHO BMI classification.

BMI Category	Number of participants (n=100)	%
Underweight	10	10.0
Normal weight	38	38.0
Overweight	33	33.0
Obese Class I	12	12.0
Obese Class II	5	5.0
Obese Class III	2	2.0

Table 2: AUB Types by BMI category.

BMI Category	Frequency	AUB-O (%)	AUB-E (%)	AUB-I (%)	AUB-N (%)	AUB-P (%)
Underweight	6	2 (33.3)	1 (16.7)	0 (0.0)	3 (50.0)	0 (0.0)
Normal weight	21	3 (14.3)	5 (23.8)	2 (9.5)	10 (47.6)	1 (4.8)
Overweight	18	4 (22.2)	6 (33.3)	2 (11.1)	4 (22.2)	2 (11.1)
Obese	10	5 (50.0)	3 (30.0)	1 (10.0)	1 (10.0)	0 (0.0)

Table 3: Association between BMI and AUB.

BMI category	Number of Women with AUB	Percentage with AUB (%)	Z-Test (P value)
Underweight	6	60.0	0.045*
Normal weight	21	55.3	0.034*
Overweight	18	66.7	0.002**
Obese	10	83.3	<0.001**

*p<0.05, **p<0.01.

Table 4: Menstrual characteristics in women with AUB.

Menstrual Characteristic	Number of Women (n=55)	%
Duration of menstrual flow		
1–3 days	12	21.8
4–6 days	30	54.5
>6 days	13	23.6
Amount of menstrual flow		
Normal	21	38.2
Heavy	34	61.8
Frequency of periods		
Regular (21–35 days)	24	43.6
Irregular (>35 or <21 days)	31	56.4

Continued.

Menstrual Characteristic	Number of Women (n=55)	%
Association with pain		
Present	19	34.5
Absent	36	65.5

Table 5: Obstetric history in women with AUB.

Obstetric history	Number of Women (n=55)	%
Parity		
Nulliparous	10	18.2
Primiparous	15	27.3
Multiparous	30	54.5
Time since last delivery (in years)		
<1	5	9.1
1–3	18	32.7
>3	32	58.2

DISCUSSION

The prevalence of AUB was significantly correlated with BMI, indicating that higher BMI categories were associated with increased rates of AUB. In comparison to 66.7% of overweight women, 60.0% of underweight women and 55.3% of women with normal BMI, 83.3% of obese women experienced AUB (p<0.001). The data indicate a significant increase in the prevalence of AUB (p<0.05) with rising BMI (Table 3). In a study of women with abnormal uterine bleeding (AUB) (n=55), 54.5% experienced menstrual durations of four to six days, while 23.6% reported periods exceeding six days.

Among the cases, 56.4% exhibited irregular menstrual cycles, while 61.8% experienced heavy menstrual flow. Among the women surveyed, 34.5% indicated experiencing dysmenorrhea, while 65.5% reported the absence of pain. The findings indicate that in patients with AUB, prolonged, heavy and irregular bleeding patterns occur with greater frequency (Table 4). In a study of women with AUB (n=55), the majority were multiparous (54.5%), followed by primiparous (27.3%) and nulliparous (18.2%), as indicated by obstetric analysis. Table 5 indicates that 58.2% of women had given birth more than three years prior, 32.7% within one to three years and 9.1% within the last year.

AUB was found in 55.3% of the study group and increased with BMI. AUB was reported by 55.3% of normal-weight, 66.7% of overweight, 83.3% of obese class I and 60% of underweight women. AUB was found in all obese classes II and III women, demonstrating a strong connection with higher BMI (p<0.05). Many women with abnormal uterine bleeding (AUB) had irregular periods (56.4%), heavy bleeding (61.8%) and monthly flow duration of 4–6 days (54.5%). Dysmenorrhea affected 34.5% of AUB women. Multiparous women (54.5%) are more likely to have AUB than primiparous (27.3%) and nulliparous (18.2%) women. The findings support prior AUB-BMI association research. One study indicated that 81% of AUB patients had a BMI above normal, indicating weight management as a preventative measure. Studies show that high BMI increases AUB risk.[9] In women with abnormal uterine bleeding (AUB), high BMI is a risk factor for atypical endometrial hyperplasia, a precursor to endometrial cancer.[10,11] Dietary advice and lifestyle interventions may reduce menstrual irregularities linked with elevated BMI, according to prospective studies.[12]

Research suggests that BMI may be a better predictor of endometrial hyperplasia or cancer than age.[13] An Ethiopian study found that just 14.21% of participants had a BMI of 25 or above, whereas 73.95% were within the normal BMI range of 18.5–24.9 kg/m^2, explaining the lower prevalence of AUB at 24.2%.[14]

This study contradicts earlier findings by showing that all obese classes II and III women had a 55.3% prevalence of abnormal uterine bleeding (AUB), which increased with BMI. This gap is due to the Ethiopian study included more women with normal BMI, while the current study included more overweight and obese women. A systematic review and meta-analysis found a non-linear relationship between obesity and uterine fibroids, with increases in incidence and prevalence.[15] Further study has connected endometrial irregularities in abnormal uterine bleeding to obesity and hypertension, emphasising the need for complete examinations.[16] Inherited BMI and waist-to-hip ratio are linked to reproductive problems including irregular uterine haemorrhage.[17] Endometrial thickness, dysmenorrhea and BMI are also diagnostic factors for AUB when paired with ultrasonography and bleeding patterns.[18]

The findings of this study indicate the significant role of high BMI in the onset and progression of AUB. The findings indicate that incorporating BMI measurement into routine gynaecological examinations can enhance the understanding and management of AUB. Addressing obesity through therapeutic and preventative strategies

may reduce the burden of AUB and associated menstrual disorders.

CONCLUSION

This study shows that obesity is a substantial risk factor for ovulatory failure and irregular uterine haemorrhage. The findings also suggest that multiparity, dysmenorrhea and excessive and irregular bleeding may cause AUB. These findings suggest that gynaecological examinations should include BMI measurement to identify AUB-prone women. Weight control, lifestyle improvements and early detection can dramatically reduce AUB and its complications. The connection between monthly irregularities, reproductive health and BMI should be studied to improve patient outcomes.

REFERENCES

1. Whitaker L, Critchley HO. Abnormal uterine bleeding. Best practice & research. Clinical obstetrics & Gynaecol. 2016;34:54–65.
2. Munro MG, Critchley HO, Broder MS, Fraser IS. FIGO Working Group on Menstrual Disorders. FIGO classification system (PALM-COEIN) for causes of abnormal uterine bleeding in nongravid women of reproductive age. Int J Gynaecol Obstet. 2011;113(1):3-13.
3. De Lorenzo A, Soldati L, Sarlo F, Calvani M, Di Lorenzo N, Di Renzo L, et al. Newobesityclassification criteria as a tool for bariatric surgery indication. World J Gastroenterol. 2019;25(8):912-22.
4. Kominiarek MA, JungheimES. The relationship between obesity and reproductive health. J Women Health (Larchmt). 2021;30(1):9-12.
5. Lashen H, Eftekhar M, JafarbeglooE. Metabolic and reproductive effects of obesity on female fertility. Hum Reprod Update. 2020;26(2):165-76.
6. Munro MG, Critchley HO, Fraser IS, FIGOWorking Group on Menstrual Disorders. The FIGO classification of causes of abnormal uterine bleeding in the reproductive years. Fertil Steril. 2018;110(3):400-5.
7. Sanders JA, Mendelsohn D, Vincent KL, Vollenhoven BJ. Obesity and reproductive dysfunction in women. Obes Rev. 2018;19(2):127-37.
8. Shah DK, Dunsmoor-Su RF, Shen SS. The association between body mass index and menstrual irregularity: Evidence from the National Health and Nutrition Examination Survey III. Am J Obstet Gynecol. 2019;221(1):61-6.
9. Sharma A, Gupta S. Analysis of body mass index in patients with abnormal uterine bleeding. Int J Clin Obstet Gynaecol. 2019;3(1):18.
10. Kahn JL, Buckingham L, Koelper NC. Risk factors for atypical hyperplasia and endometrial cancer in the infertility population: a case-control study. F&S Reports. 2020;2(1):104–8.
11. Akalyaa K, Shakuntala P, Renuka R. Correlation of body mass index and abnormal uterine bleeding in premenopausal women. Int J Reprod Contracept Obstet Gynecol. 2020;9:4640.
12. Rashmi K, Kk T, Sukanya S. A prospective study of the association of body menstrual index with menstrual disturbances between 20- 40 years. Gynae. 2020;4:26-9.
13. Abebe M, Melaku G, Hareru HE. Abnormal uterine bleeding and its associated factors among reproductive-age women who visit the gynecology ward in Dilla University General Hospital, Southern Ethiopia. BMC Women's Health. 2022;24(1):281.
14. Helou C, Zhao Z, Ding T, Anderson T, Harvey L. Should body mass index replace age to drive the decision for endometrial sampling in premenopausal women with abnormal uterinebleeding. Gynecol Endocrinol. 2022;38:432-7.
15. Qin H, Lin Z, Vásquez E, Luan X, Guo F, XuL. Association between obesity and the riskof uterine fibroids: a systematic reviewand meta- analysis. J Epidemiol Community Health. 2020;75:197-204.
16. Kocevska A, Zafirov D, Petrusevska G, Skeparovska K, Stratrova S. Histopathological changes of the endometriumin patients withabnormal uterine bleeding and association withsome risk factors. J Morphol Sci. 2021;3:988-9.
17. Venkatesh S, Ferreira T, Benonisdottir S, Rahmioglu N, Becker C, Granne I, et al. Obesity and risk of female reproductiveconditions: A Mendelian randomization study. PLoS Med. 2022;19:349.
18. Xu Y, Xie D. Prediction of factors associatedwith abnormal uterine bleeding by transvaginal ultrasound combined with bleeding pattern. Comput Math Methods Med. 2022;2:5653250.