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# Association Of Body Mass Index with Thickened Endometrium in Patients with Post Menopausal Bleeding

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***Abstract:*** ***Objective:*** To establish the relationship between body mass index (BMI) and clinical features, endometrial thickness and histopathological outcome among postmenopausal women who present with bleeding. ***Methods:*** This was a prospective cohort study that would be carried out at Jinnah Postgraduate Medical Centre (Ward 8, Department of Obstetrics and Gynecology) between January and June 2025 following the approval of an Institutional Review Board (NO.F.2-81/2025-GENI/327/JPMC). Non-probability consecutive sampling was used to recruit 64 postmenopausal women who had vaginal bleeding. The SPSS version 21 was used in statistical analysis. Mean and SD were used to express quantitative variables whereas frequencies and per cent were used to express categorical variables. They were applied using independent t-test, chi-square /Fisher's exact test and odds ratios, with a $p<0.05$ being in statistical significance. ***Results:*** The mean age was 60.3 ± 5.5 years. Obesity (BMI>30 kg/m 2 ) was found in 59.4 percent of the patients. Majority of the participants were multiparous (79.7) and half of them had no comorbidities (51.6). The thickness of the endometrium was observed to be 1120 mm in 51.6% of cases. Endometrial polyps was found to be the most frequent finding (34.4%), then atrophic endometrium (25%), and endometrial carcinoma (18.8). In 7.8% of patients atypical hyperplasia was diagnosed. ***Conclusion:*** These results indicate that although obesity is prevalent among such a population, it is not necessarily an independent predictor of endometrial pathology and that there is a need to evaluate all patients with PMB holistically.

***Keywords:*** : Postmenopausal bleeding; Endometrial thickness; Obesity; Endometrial hyperplasia; Endometrial carcinoma

## INTRODUCTION

According to the World Health Organization, menopause refers to the total termination of menstruation period of at least a year, which normally happens after age 46 (1). Postmenopausal bleeding can be described as repeated bloody discharges of the genital tract in menopausal women (2). It is a common condition that is frequently experienced in gynecological practice and is a concern of underlying endometrial hyperplasia or malignancy (3). The etiologies of postmenopausal bleeding are benign and malignant and involve infection of the genital tract, endocrine, malignancies and systemic (4).

Endometrial hyperplasia is a uterine disease that is typified by a continuum of morphological variations in the endometrium, mainly typified by a greater gland-to-stroma ratio in contrast to normal

proliferative endometrium. The clinical importance of it is that it may develop into endometrial carcinoma (5). Endometrial cancer (EC) is the gynecological malignancy most prevalent in developed nations and the second most prevalent globally. It is slowly gaining popularity especially among women who have risk factors like obesity, polycystic ovarian syndrome, diabetes mellitus, and nulliparties (6). It is believed in developed nations that there are around 200,000 new cases of endometrial hyperplasia cases reported annually, as noted in a study by Ordegirzeni et al. (7).

M. Kaleem et al. state that the rate of endometrial cancer is growing at an alarming rate and it is believed that it will rise by 50 percent in 2040 (8). According to the Medical Journal of Cairo University (9), the risk of endometrial cancer is about 1% in women aged 50 years with postmenopausal bleeding, and the risk rises to 25% when the age is 80. High BMI is a proven risk factor of endometrial cancer. According to Emma Hazelwood et al. (10), it is revealed that every 5 kg/m 2 of BMI increase is equivalent to 54 percent increase in risk of endometrial cancer, based on a meta-analysis of 30 prospective studies in BMC Medicine. Obesity has a high association with elevated risk of various malignancies especially endometrial cancer (11).

One of the new societal health issues affecting the world, and Pakistan is one of them, is obesity, which has mainly been caused by unhealthy lifestyles and unhealthy eating habits. Women who present with postmenopausal bleeding are thus to be given careful examination including transvaginal ultrasound and endometrial sampling.

Transvaginal ultrasound is a non-invasive first-line diagnostic modality that helps to evaluate endometrial thickness (ET) and identify pathological alterations of the endometrium (12,13). A low risk of malignancy is linked with an endometrial thickness of less than 5 mm, and a thickness of more than 5 mm predisposes an individual to endometrial pathology (12). Moreover, endometrial thickness more than 4 mm is shown to be about 98% sensitive to endometrial cancer. In this situation, endometrial sampling by histopathology by Pipette biopsy or hysteroscopy-guided biopsy is needed to make a definitive diagnosis (14).

## MATERIALS AND METHODS

This study was a prospective cohort study which is to be carried out at Jinnah Postgraduate Medical Centre (Ward 8, Department of Obstetrics and Gynecology) between January 2025 and June 2025 having been approved by the Institutional Review Board (No. F.2-81/2025-GENI/327/JPMC). A total of 64 post-menopausal women who presented with vaginal bleeding were recruited through non-probability consecutive sampling method. The sample size was determined with the help of World Health Organization sample size calculator, the level of significance used was 95% and the expected proportion was 0.043.

Obesity was determined as abnormality or excess accumulation of fats that are considered to be dangerous to health with a body mass index (BMI) exceeding 25kg/m2, obese exceeding 30kg/m 2 and morbid exceeding 40kg/m 2. The diagnostic imaging modality that was employed was transvaginal ultrasound which was performed to examine the organs of the pelvis such as the uterus and the endometrial thickness using a transducer inserted into the vagina. Pipelle biopsy was done as an outpatient procedure where endometrial tissue was obtained with the help of plastic suction curette and subjected to histopathological analysis and hysteroscopy-guided biopsy was done as a minimally invasive procedure to have a closer view of the uterine cavity with the help of a hysteroscope. Endometrial hyperplasia was described as irregular proliferation of endometrial glands with a higher ratio of glands to stroma than normal proliferative endometrium and categorized by the revised 2014 world health organization classification into either hyperplasia without atypia or atypical hyperplasia.

The study included postmenopausal women with vaginal bleeding, BMI more than 25 kg/m2, and endometrial thickness more than 5 mm. Women who had genital tract malignancy that was diagnosed, coagulation disorders, women on hormone replacement therapy were excluded as well as women with breast cancer who were on hormone replacement therapy. The structured questionnaire was used to gather data in the outpatient department with informed consent being given. Patients who passed the eligibility criteria were recommended transvaginal ultrasound and those with an endometrial thickness of more than 5 mm had endometrial sampling performed using Pipelle biopsy or hysteroscopy-guided biopsy. All the subjects received a particular identification code, and histopathology reports were acquired in order to make a definitive diagnosis and further treatment.

The SPSS version 21 was used to analyze data. Mean standard deviation or median with interquartile range were used to describe quantitative variables, like age and duration of bleeding, as desired. The age of independent t-test or Mann Whitney U test was used to compare the difference in the continuous variables such as bleeding time, endometrial thickness across the age groups. Associations between categorical variables, such as parity, comorbidities, addiction

status, and length of time since menopause were tested using the chi-square test. Odds ratios were done to determine the confounding influence of variables like parity, comorbidities, history of cancer, and BMI on bleeding and endometrial thickness. The p-value of less than 0.05 was taken as significant.

## RESULTS

A total of 64 postmenopausal women presenting with postmenopausal bleeding were included in the analysis. The mean age of the study population was 60.3 ± 5.5 years. More than half of the participants had no documented comorbid illness (33, 51.6%), while diabetes and hypertension were each present in 9 (14.1%) patients, and both conditions coexisted in 5 (7.8%) patients. The majority of women were multiparous (51, 79.7%). Obesity was highly prevalent, with 38 (59.4%) patients having a body mass index (BMI) >30 kg/m², while 26 (40.6%) had a BMI between 25.1–30 kg/m².

Most participants reported no history of addiction (55, 85.9%). A duration of menopause greater than five years was observed in 40 (62.5%) women, and a family history of malignancy was present in 12 (18.8%). The majority of patients presented with isolated postmenopausal bleeding without associated symptoms (41, 64.1%). Among those with additional complaints, abnormal vaginal discharge was reported in 11 (17.2%), lower abdominal pain in 7 (10.9%), and vulval itching in 5 (7.8%). The duration of bleeding was less than six months in most cases (47, 73.4%). On transvaginal ultrasound, endometrial thickness of 11–20 mm was observed in 33 (51.6%) patients, while 31 (48.4%) had a thickness between 5–10 mm. Histopathological evaluation revealed endometrial polyps as the most frequent finding in 22 (34.4%) cases, followed by atrophic endometrium in 16 (25.0%) and endometrial carcinoma in 12 (18.8%). Endometrial hyperplasia with atypia was present in 5 (7.8%) patients, while hyperplasia without atypia was identified in 3 (4.7%) patients.

**Table 1: Demographic and Clinical Characteristics:**

| | | |
|---|---|---|
| age | Mean ± Standard Deviation | 60.3 ± 5.5 |
| | | N (%) |
| Comorbids | none | 33 (51.6) |
| | Diabetes | 9 (14.1) |
| | Hypertension | 9 (14.1) |
| | diabetes & hypertension | 5 (7.8) |
| | others | 8 (12.5) |
| Parity | Nulliparous | 13 (20.3) |
| | Parous | 51 (79.7) |
| BMI | 25.1-30 | 26 (40.6) |
| | >30 | 38 (59.4) |
| addiction | none | 55 (85.9) |
| | smoking | 3 (4.7) |
| | tobacco | 6 (9.4) |
| postmenopausal | < 5 years | 24 (37.5) |
| | > 5 years | 40 (62.5) |
| Family history cancer | No | 52 (81.3) |
| | Yes | 12 (18.8) |
| POST MENOPAUSAL SYMPTOMS | Lower Abdomen Pain | 7 (10.9) |
| | Abnormal Discharge | 11 (17.2) |
| | Vulval itching | 5 (7.8) |
| | no associated symptoms | 41 (64.1) |
| Duration of bleeding pmb | 1 -6 months | 47 (73.4) |
| | > 7 months | 17 (26.6) |
| ultrasound findings | endometrial thickness | 0 (0) |
| | 5mm - 10 mm | 31 (48.4) |
| | 11mm - 20 mm | 33 (51.6) |
| histopathology | proliferative | 0 (0) |
| | secretory | 0 (0) |
| | atrophic | 16 (25) |
| | hyperplastic | 5 (7.8) |

| | | |
|---|---|---|
| | complex | 1 (1.6) |
| | without atypia | 3 (4.7) |
| | with atypia | 5 (7.8) |
| | Endometrial polyp | 22 (34.4) |
| | endometrial carcinoma | 12 (18.8) |
| | Normal | 0 (0) |

Patients were stratified into two groups based on BMI (25.1–30 kg/m² and >30 kg/m²). A statistically significant difference in mean age was observed between the two groups, with higher age in the BMI >30 group (62.3 ± 4.3 vs. 57.4 ± 5.9 years, p <0.001). No significant association was found between BMI categories and comorbidities, parity, addiction, duration since menopause, family history of cancer, presenting symptoms, duration of bleeding, ultrasound findings, or histopathological outcomes (all p >0.05).

**Table 2: Association of Body Mass Index with Clinical and Pathological Characteristics (n = 64)**

| **Variable** | **Category** | **BMI 25.1–30 (n=26)** | **BMI >30 (n=38)** | **p-value** |
|---|---|---|---|---|
| Age (years) | Mean ± SD | 57.4 ± 5.9 | 62.3 ± 4.3 | <0.001* |
| Comorbidities | None | 15 (57.7) | 18 (47.4) | 0.70** |
| | Diabetes | 2 (7.7) | 7 (18.4) | |
| | Hypertension | 3 (11.5) | 6 (15.8) | |
| | DM + HTN | 2 (7.7) | 3 (7.9) | |
| | Others | 4 (15.4) | 4 (10.5) | |
| Parity | Nulliparous | 6 (23.1) | 7 (18.4) | 0.65*** |
| | Parous | 20 (76.9) | 31 (81.6) | |
| Addiction | None | 24 (92.3) | 31 (81.6) | 0.40** |
| | Smoking | 0 (0) | 3 (7.9) | |
| | Tobacco | 2 (7.7) | 4 (10.5) | |
| Duration since menopause | <5 years | 12 (46.2) | 12 (31.6) | 0.30*** |
| | ≥5 years | 14 (53.8) | 26 (68.4) | |
| Family history of cancer | No | 23 (88.5) | 29 (76.3) | 0.30** |
| | Yes | 3 (11.5) | 9 (23.7) | |
| Symptoms | None | 17 (65.4) | 24 (63.2) | 0.58** |
| | Abnormal discharge | 6 (23.1) | 5 (13.2) | |
| | Lower abdominal pain | 2 (7.7) | 5 (13.2) | |
| | Vulval itching | 1 (3.8) | 4 (10.5) | |
| Duration of bleeding | 1–6 months | 20 (76.9) | 27 (71.1) | 0.78*** |
| | >6 months | 6 (23.1) | 11 (28.9) | |
| Endometrial thickness | 5–10 mm | 14 (53.8) | 17 (44.7) | 0.61** |
| | 11–20 mm | 12 (46.2) | 21 (55.3) | |
| Histopathology | Atrophic | 8 (30.8) | 8 (21.1) | 0.80** |
| | Hyperplasia | 3 (11.5) | 2 (5.3) | |
| | Complex | 0 (0) | 1 (2.6) | |
| | Without atypia | 1 (3.8) | 2 (5.3) | |
| | With atypia | 2 (7.7) | 3 (7.9) | |
| | Endometrial polyp | 9 (34.6) | 13 (34.2) | |
| | Endometrial carcinoma | 3 (11.5) | 9 (23.7) | |

* Independent sample t-test
** Fisher's exact test
*** Chi-square test

## DISCUSSION

This paper was going to assess the histopathological, ultrasonographic, clinical, and demographic profile of women with a presentation of postmenopausal bleeding, especially focusing on the body mass index (BMI) and underlying endometrial pathology. The results showed that the most common causes of bleeding were benign endometrial changes, especially atrophic endometrium and endometrial polyps, although an endometrial carcinoma was detected in a significant clinical percentage of patients.

The average age of the participants in the current research was 60.3 ± 5.5 years; this is a little bit older as compared to other researches. As an example, the mean age of 57.2 years has been reported in a study by DA Salih et al. (15), and the mean age of 52.6 years has been recorded in another study (16). This difference can be based on the difference in population attributes, healthcare-seeking behavior or study contexts.

In this research, transvaginal ultrasound was also very critical in patient assessment. It has been considered to be the primary imaging modality of determining endometrial thickness in women with postmenopausal bleeding. Most of the patients in the current study had endometrial thickness of more than 5 mm, which provides evidence of the need to conduct further endometrial sampling to rule out malignancy. Similar results are stated in previous sources, in which the overall mean thickness of endometria was 10.6 mm and 13.4 mm in obese patients (15). In this investigation, the majority of patients were found to possess an endometrial thickness of 1120 mm, and obese females were prone to this percentage (55.3%). Other previous researches have also established that BMI correlates positively with endometrial thickness (15, 17, and 18).

Obesity became one of the clinical factors to be prominent among this cohort. A significant percentage of the patients were found to have a BMI over 30 kg/m 2 and endometrial carcinoma was more common in obese people than those who had a low BMI. Even though this relation was not statistically significant in this study, the direction of the observed relation is consistent with known biological processes that suggest a relationship between obesity and endometrial carcinogenesis. There were also metabolic comorbidities like high blood pressure and diabetes mellitus that were generally linked to obesity and were both found in a significant proportion of participants.

Endometrial carcinoma frequency in the present study was 18.8 which is in agreement with other previously reported rates of about 20% (15). It is important to note that 75 percent of endometrial cancer patients in this cohort were obese, which further confirms that high BMI is a risk factor of cancer. The prevalence of endometrial cancer in obese people has been previously documented as having a higher prevalence, but some have reported a three times higher prevalence in patients with a BMI 40kg/m 2 (24), whereas others have reported a 32 36% increased risk in obese patients (19,26) and a risk ratio of 2.57 in patients with BMI 30kg/ This is also supported by the research that noted obesity to be an important predictive factor of endometrial cancer (25).

Not every study agrees though. Folsom et al. (22) and Van den Bosch et al. (23) studies did not prove that there is a significant relationship between obesity and endometrial thickness, which underlines the diversity in the results in different populations and study designs.

A notable finding during this research was the discovery of premalignant situations especially atypical endometrial hyperplasia. This organ is defined by both architectural and cytological malformations and has a great potential of developing endometrial carcinoma unless treated (28). The presence of it highlights the need to carry out timely assessment and treatment of women who present with postmenopausal bleeding.

Although the authors assessed a wide range of clinical variables, such as the symptom profile, family history of cancer, length of time since menopause, and parity, none of the variables showed statistically significant relationships with BMI. This can be explained by the fact that the sample size is relatively small, and it might be insufficient to offer high statistical power to identify subtle differences between subgroups. However, the trends observed are still clinically significant and are in line with the existing epidemiological patterns.

There are some limitations that must be noted in this study. It was also carried out in one tertiary care center and therefore this may not be generalizable. Also, the small sample size could have decreased the chance of identifying statistically significant relationships. It is suggested that further research is needed in future using multicenter studies with more participants in order to confirm these results and provide additional insights into the impact of metabolic risk factors in the pathogenesis of endometrial disorders.

## CONCLUSION

In conclusion, while BMI did not show a significant statistical association with most clinical factors, obese participants demonstrated a higher frequency of endometrial cancer. These findings reinforce the

status of obesity as a major risk factor for uterine malignancy and emphasize the need for rigorous evaluation of postmenopausal bleeding in patients with high body mass.

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