

Relationship between body mass index, endometrial thickness and histopathological diagnosis in women with post-menopausal bleeding

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Abstract

Background and objective: Obesity is a worldwide epidemic and a public health concern. It is one of the most significant alterations occurring in the menopause. It is closely related to the development of endometrial bleeding, increase endometrial thickness and endometrial cancer. The main objectives of this study were to demonstrate the independent effects of obesity and its relationship with endometrial thickness and histopathological outcome in women experiencing vaginal bleeding after menopause.

Methods: The study included hundred women who were experiencing postmenopausal bleeding included in this study. Their obesity was calculated by BMI. Biopsy taken from them either through a Pipelle sampler as an outpatient, or hysteroscopy under general anesthesia, or with dilatation and curettage under general anesthesia for histopathology examination to decide endometrial thickness and related pathology.

Results: The mean age of the studied women was 57.2 ± 6.4 years, which ranged between 48 – 83 years. The mean endometrial thickness (ET) of the whole sample was 10.64 mm. The highest was 13.36 mm among obese women with a BMI of ≥ 35 Kg/m². There was a significant correlation between BMI and endometrial thickness. Endometrial polyps were detected in 50% women who had normal weight. The highest mean of ET (13.95 mm) was detected among women with endometrial carcinoma. There was no any significant relationship between age of menopause with the histopathological diagnosis. The highest rate of endometrial carcinoma was detected among obese women of ≥ 35 Kg/m².

Conclusion: According to the current study, obesity increases the risk of endometrial cancer and endometrial hyperplasia in postmenopausal women.

Keywords: BMI; Endometrial Thickness; PMB; TVS.

Introduction

Menopause is the loss of ovarian function followed by the cessation of menstruation, and it is often identified in women after a year without a menstrual cycle.¹ The number of postmenopausal women has grown over the last several decades in concordance with an aging population.

Menopause most likely occurs between 45 and 55 years of age.² Hot flashes, mood swings, insomnia, and recurrent urogenital tract infections are just a few of the disturbing symptoms that women

experience throughout menopause. Obesity is an abnormal or excessive buildup of fat that is regarded as a health risk,³ which in addition to being a medical issue, is also a social and economic one.

It should be considered as one of the most significant menopause-related disruptions. According to estimates, 65 percent of women in the United States between the ages of 40 and 65 and almost 74 percent of women over the age of 65 are obese.⁴ Obesity is a risk factor for endometrial precancerous lesions, including atypical

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hyperplasia and adenomatosis of the endometrium in obese menopausal women. Adipose tissue that rises with age and body weight is the main site of androstenedione to estrone conversion.⁵ In a study done by Schmandt RE, et al they found that morbid obesity (BMI > 35 kg/m²) was related to a 4.7-fold increase in endometrial cancer risk compared with normal-weight women (BMI 25 kg/m²). We used body mass index (BMI) as an obesity measure and showed that obesity (known as BMI > 30 and 35 kg/m²) was related to a 2.6-fold increase in risk of endometrial cancer.⁶

Any vaginal bleeding in a post-menopausal woman who is not on hormone replacement treatment (HRT) is referred to as post-menopausal bleeding (PMB).⁷ The prevalence of post-menopausal bleeding in the first year after menopause is 10% of the general population.⁸ It is a prevalent and concerning symptom that might indicate cervical or uterine cancer.

Endometrial atrophy (about 75% of cases), estrogen withdrawal, endometrial cancer (about 10%), atypical hyperplasia, endometrial hyperplasia without atypia, submucosal fibroids, and endometrial polyps are the main causes of postmenopausal bleeding. Radiologists and referring gynecologists often face diagnostic problems related to endometrial abnormalities.⁹ For women with PMB, transvaginal ultrasonography is often advised as a preliminary, "noninvasive" method of assessing the endometrium. Obesity may then result in an overabundance of circulating E2, which might stimulate the endometrium and heighten its thickness on sonograms.

As a result, the thickness of the endometrium as measured by sonography may vary depending on the level of obesity. The link between the level of obesity and sonographic endometrial thickness is, however, only partially documented.¹⁰

Compared to premenopausal women, postmenopausal women had a much thinner mean endometrial thickness. With

increased endometrial thickness, there is a higher chance of significant pathology (cancer) being present. By accurately determining the thickness and shape of the endometrium, the endometrial thickness cut-off TVS may pinpoint a subset of PMB patients who have an endometrium that is thin (4 mm) and consequently unlikely to develop endometrial cancer. Thus, sampling of the endometrium is not advised below this cut-off point.¹¹ The majority of endometrial cancer patients have vaginal bleeding as a symptom; otherwise, the probability of developing endometrial cancer is quite low. Patients who have a thicker endometrium should have more invasive tests done.¹²

Inappropriately, TV U/S cannot provide a definitive answer for the existence or nonappearance of cancer, but endometrial cancer is not ruled out by normal endometrial thickness on ultrasound. Therefore, the most accurate test for the diagnosis of any abnormal bleeding in post menopause is tissue biopsy. Endometrial biopsy should be performed using a Pipelle sampler, hysteroscopy, or with curettage and dilatation when the endometrial thickness is 5 mm or more in order to determine the precise diagnosis and treat the patient appropriately.¹³

Objectives:

The objectives of this study were to correlate the clinical and histopathological findings of women with postmenopausal bleeding. To identify different endometrial pathology, in relation to the result of diagnostic histopathology among obese women that present with vaginal bleeding. To evaluate the relation between trans vaginal ultrasound endometrial thickness and body mass index in post-menopausal women.

Methods

This cross-sectional study was carried out in Erbil city, Kurdistan region, Iraq at Maternity Teaching Hospital and private clinics, over period of 12 months from January 2021 to January 2022. The study

sample included 100 women presenting with post-menopausal bleeding, which included post-menopausal women that presented with vaginal bleeding after 12 months of amenorrhea. Women with vulvar, vaginal, or cervical lesions, women with a self-reported history of breast cancer on tamoxifen, women with coagulation problems, women on anticoagulant drugs, and women who are on hormonal replacement therapy are excluded.

After the verbal consent of each patient, the data of barefoot height and weight was taken and collected by using a standardized-weight-scale. BMI is calculated as “BMI = weight (kg)/square height (meter)”.

A complete history was taken with proper pelvic examinations done, which involved an examination of speculum achieved to permit evaluation of tumors of the cervix and atrophic vaginitis, cervical polyps, vulva or vagina for excluding any local cause of bleeding.¹⁴

All women underwent a transvaginal ultrasound examination by an experienced radiologist in the maternity hospital and private sector clinics using an ultrasound machine (Philips, clear vue 650) in private clinics and Siemens healthineers in the maternity teaching hospital. The thickest part of the endometrium was obtained. All menopausal women that presented with vaginal bleeding endometrial biopsy taken from them either through a Pipelle sampler

as an outpatient, hysteroscopy under general anesthesia, or with dilatation and curettage under general anesthesia.¹⁵ Histological assessment was performed by the pathologists from the Department of Pathology, Erbil maternity teaching hospital. Samples were differentiated according to histopathological results into endometrial polyps, hyperplasia with atypia, hyperplasia without atypia, and endometrial carcinoma.¹⁶

Statistical analysis

Utilizing the Statistical Package for Social Sciences (SPSS, version 25), data were examined. When the predicted frequency (value) of more than 20% of the table's cells was less than 5, the exact test of Fisher was utilized (instead of the Chi square test). one-way analysis of variance (ANOVA) was utilized to analyze more than two means. A post-hoc test (LSD) was performed to evaluate each pair of means, (after doing the ANOVA). To measure the strength of the correlation, the Pearson (r) correlation coefficient was determined. Statistical significance was defined as a P value of ≤ 0.05.

Results

The mean age (SD) of the studied population was 57.2 (6.4) years, the age range was 48 – 83 years, and the median age was 56 years. It shows that the largest proportion (45%) of the women aged 55-64 years, as presented in Table 1.

Table 1 Age distribution of sample

	No. (100)	%
Age (years)		
< 55	42	42.0
55-64	45	45.0
≥ 65	13	13.0
Mean (SD)	57.2	(6.4)

The mean endometrial thickness (ET) of the whole sample was 10.64 mm. It was highest (13.36 mm) among obese women with a BMI of ≥ 35 Kg/m², and lowest (9.34 mm) among women with a BMI of

25-29 Kg/m² ($P = 0.005$). as presented in Table 2.

As seen in Figure 1, there was a positive, significant association between the ET and the BMI ($r = 0.299$, $P = 0.003$).

Table 2 Mean of endometrial thickness by BMI categories

BMI (Kg/m ²)	N	Mean of endometrial thickness (mm)	(SD)	P^*	LSD (groups)	P (LSD)
A. < 25	4	10.25	(1.50)		A X B	0.678
B. 25-29	32	9.34	(3.22)		A X C	0.996
C. 30-34	42	10.24	(3.75)	0.006	A X D	0.166
D. ≥ 35	22	13.36	(5.83)		B X C	0.355
Total	100	10.64	(4.31)		B X D	0.001
					C X D	0.005

* B

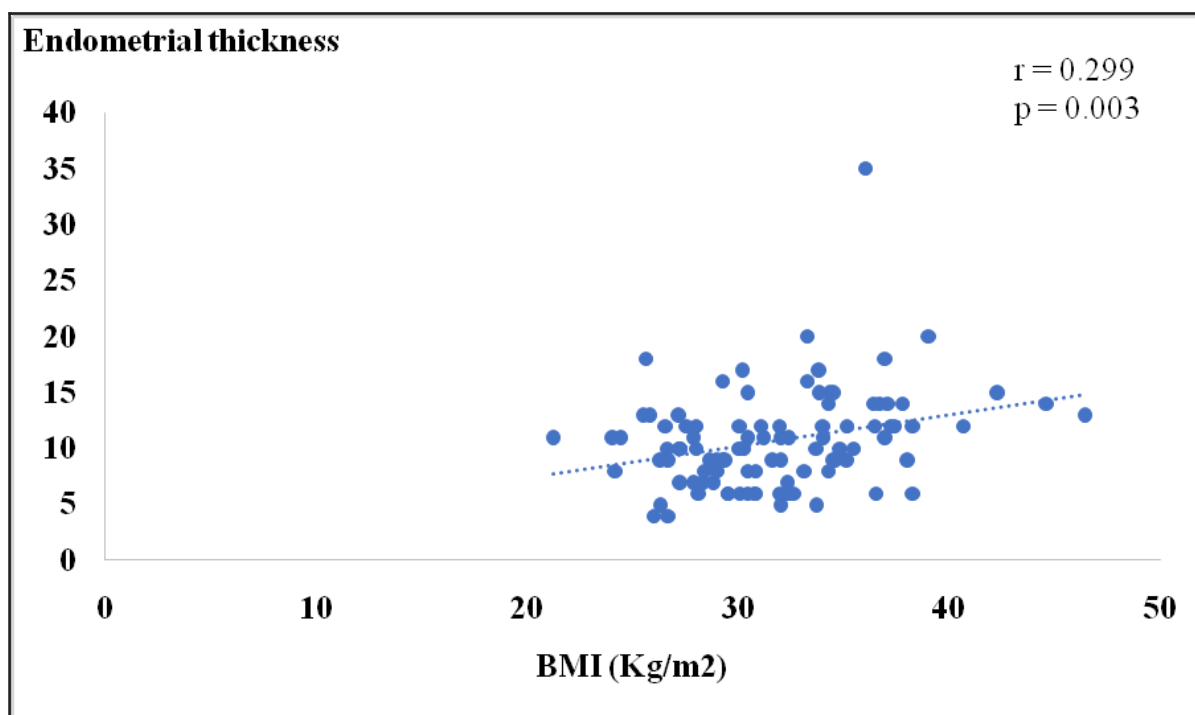


Figure 1 Correlation between endometrial thickness and BMI

It is evident in Table 3 that the highest rate of endometrial carcinoma was detected among obese women of ≥ 35 Kg/m². The highest rate of endometrial polyps (50%) was detected among women of normal weight ($P = 0.021$).

The highest mean of ET (13.95 mm) was detected among women with endometrial carcinoma and the lowest rate (9.27 mm) was detected among women with hyperplasia without atypia ($P < 0.001$) as presented in Table 4.

Table 3 Histopathological findings by BMI categories

	BMI (Kg/m ²)				Total No. (%)	P value
	< 25	25-29	30-34	≥ 35		
	No. (%)	No. (%)	No. (%)	No. (%)		
Hyperplasia without atypia	2 (50.0)	20 (62.5)	21 (50.0)	12 (54.5)	55 (55.0)	
Hyperplasia with atypia	0 (0.0)	3 (9.4)	11 (26.2)	1 (4.5)	15 (15.0)	
Endometrial carcinoma	0 (0.0)	5 (15.6)	6 (14.3)	9 (40.9)	20 (20.0)	0.021*
Endometrial polyp	2 (50.0)	4 (12.5)	4 (9.5)	0 (0.0)	10 (10.0)	
Total	4 (100.0)	32 (100.0)	42 (100.0)	22 (100.0)	100 (100.0)	

*By Fisher's exact test.

Table 4 Means of endometrial thickness by histopathological diagnosis

	N	Mean of endometrial thickness (mm)	(SD)	P (ANOVA)	LSD (groups)	P (LSD)
Hyperplasia without atypia	55	9.27	(3.44)		A X B	0.016
Hyperplasia with atypia	15	12.07	(3.59)		A X C	<0.001
Endometrial carcinoma	20	13.95	(5.79)	<0.001	A X D	0.925
Endometrial polyp	10	9.40	1.26)		B X C	0.162
Total	100	10.64	(4.31)		B X D C X D	0.099 0.003

Discussion

In women of menopausal age, postmenopausal bleeding is a warning sign since it might be the only indication of endometrial carcinoma, the most common gynecological cancer. In addition, obesity is a worldwide epidemic and a public health concern, ranking among the top five medical conditions in developed countries and the top ten in developing nations that are directly linked to an increased risk of endometrial thickness and endometrial cancer.¹⁷

The current study found that the patients' mean age with postmenopausal bleeding was 57.2 years, with a range of 48-83 years, whereas El-Mowafi et al. found that postmenopausal bleeding in Egyptian women occurred at an average age of 52.6 years, with a range of 48 to 56 years.¹⁸ The mean endometrial thickness (ET) of the whole sample was 10.64 mm.

The mean endometrial thickness increased with body weight and was substantially correlated with BMI in postmenopausal bleeding women. It was greatest (13.36 mm) in obese women with a BMI of 35 kg/m² and lowest (9.34 mm) in women with a BMI of 25–29 kg/m². There is still a lot of controversy over the connection between postmenopausal women's sonographic endometrial thickness and BMI.

Our findings are consistent with the findings of Elgarhy et al., who show a substantial positive connection between endometrial thickness and BMI.¹⁹ Additionally, we discovered that obese women with a body mass index of more than 35 Kg/m² had the greatest prevalence of endometrial cancer. The research revealed a favorable correlation between endometrial cancer and higher BMI. Accordingly, Widderpas et al.'s²⁰ research indicated that postmenopausal women with a BMI of 30 to 33.9 kg/m² had a threefold increased chance of developing endometrial malignancy due to the association between obesity and endometrial hyperplasia, which is similar to the findings of our results.

One of the most crucial indicators for identifying people at high risk for an underlying cancer is endometrial thickness. We found the highest mean of ET that was measured through transvaginal ultrasound was 13.95 mm, which was detected among women with endometrial carcinoma, and the lowest rate of 9.27 mm was detected among women with hyperplasia without atypia ($P < 0.001$). In another research, which was conducted by Zhang et al., in comparison to women with normal weight, the risk of endometrial cancer was shown to be 32 percent greater in overweight women (BMI 25–30) and 2.5 times higher in obese women (BMI > 30). (BMI 25).²¹ According to Wong et al., the median endometrial thickness of women with endometrial cancer was 15.7 mm, as opposed to 3.2 mm in those who did not have the disease.¹³

Conclusion

The current study discovered that the obesity increases the risk of endometrial hyperplasia and endometrial cancer in women who have presented with postmenopausal bleeding. Also, showed significant correlation between the ET and the BMI, and the highest mean of ET was detected among women with endometrial carcinoma. The study also revealed that there was no any significant relationship between age and the histopathological diagnosis.

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Competing interests

The authors declare that they have no competing interests.

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