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RELATIONSHIP OF ULTRASONOGRAPHIC ENDOMETRIAL THICKNESS AND MORPHOLOGY TO BODY MASS INDEX IN POSTMENOPAUSAL WOMEN

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ABSTRACT

Background: Menopause is that point in time where permanent cessation of menstruation occurs following the loss of ovarian activities. Ultrasonography is simple, non-invasive technique, highly acceptable to the patient. It offered detailed delineations of the uterus and its myometrium, endometrium and vessels. So, several uterine disorders can be evaluated by ultrasound.. BMI is an inexpensive and simple method of classifying for weight categories that may lead to health troubles

Objective: To investigate the relationship between ultrasonographic endometrial thickness and morphology to body mass index in postmenopausal women.

Materials and Methods: Three hundred postmenopausal women (mean age, 59.95±3.73 years; range 55-65) were studied. Age, years since menopause and BMI characteristics were recorded. The relationship between ultrasonographic endometrial thickness and morphology to baseline characteristics was evaluated in each woman.

Results: BMI was positively correlated with endometrial thickness ($r= 0.841$), but age and years since menopause were negatively correlated ($r= -0.224$) ($r= -2.84$).

Conclusion: There is positive relationship between BMI and endometrial thickness in asymptomatic postmenopausal females.

Keywords: Body mass index; endometrial thickness; transvaginal ultrasonographic.

INTRODUCTION

Menopause is a date for those women who still have a uterus, it is defined as the day after a woman's last period ever finishes. This span of time is also referred to as "change of life" or "climacteric". The average age of menopause is 51 years, and the normal age range for last period ever is somewhere between 45 to 55.¹ A woman who still has uterus can be declared to be in post menopause once she has gone 12 full months with no flow at all, not even any spotting. The reason for this delay in declaring a woman post menopausal is because periods become very erratic at this time of life, and therefore a

reasonably long stretch of time is necessary to be sure that the cycling has actually ceased. At menopause, the ovaries produce less of the hormone estrogen. Less progesterone is produced as well. Although periods tend to be less regular around menopause, irregular bleeding can be a sign of problems.² Transvaginal ultrasound is routinely performed as part of a pelvic examination in postmenopausal woman.³ The normal value of endometrial thickness in asymptomatic postmenopausal women is ≤ 5 mm. Five millimeters has been "cut off point" for excluding endometrial pathology after menopause and more than 5mm need endometrial pathology

to exclude disease.⁴ Body mass index “BMI” is a number calculated from a person’s weight and height. BMI is an inexpensive and easy to perform method of screening for weight categories that may lead to health problems.⁵ Formula = weight (kg) / (height (m))².⁶

BMI of 18.5- 24.9kg / m² is normal weight .

BMI under 18. 5 kg / m² indicate under weight.

BMI of 25-29.9 kg / m² indicate overweight.

BMI over 30 kg / m² indicate obesity .

BMI over 40 kg / m² indicate morbid obesity

Obesity increases endogenous free estrogen level including peripheral conversion of adrenal steroids by fat cells and decreased levels of sex hormones binding globulin.⁷ It has been shown that women who are 20 – 50 pounds overweight have threefold and women more than 50 pounds have tenfold increased risk of endometrial cancer.⁸ Several studies (Andolf *et al.*, 1993)⁷ and (Douchi, *et al.*, 1998)⁸ have reported relationship between obesity and endometrial thickness, also as risk factor in development of endometrial cancer that stimulate us to do this study. The aim of the work is to find if there is any relationship between ultrasonographic endometrial thickness and morphology to body mass index in postmenopausal women.

METHODS

Three hundred Postmenopausal women were included in this study. They attended outpatient clinics of Internal medicine at Zifta General Hospital and Benha University Hospital. Patients were at least one year post menopause. Participations in the study were voluntary and based on the women who want to fill and sign informed consent. They informed that all collected data and information will be strictly confidential and will not be accessed by any other party without prior permission from the participant. The participants had the right to withdraw from the study at any given time without giving any explanation. All cases were subjected to the following: Complete History Taking, General

examination including weight, height BMI is calculated as follows: BMI = weight (kg) / height (m²). Vaginal sonography was done to all patients by Ultrasonography apparatus (TOSHIBA (Japan) with transvaginal probe 7.53 MHZ). The transducer tip was covered with ultrasound coupling gel and introduced into a protective sheet; a small amount of gel was applied the uterus was also systematically scanned for other incidental pathology. The endometrial thickness is measured from the proximal and distal interfaces between highly reflective and surrounding poorly reflective layers and measured in longitudinal axis of the uterus. Endometrial texture is examined to notice the presence of asymmetry. Irregularity or local thickening of the endometrium denoting the presence of a symmetrical endometrial hyperplasia or endometrial carcinoma. Endocervical canal was examined to exclude cervical pathological lesions. The ovaries were then examined to diagnose the presence or absence of associated ovarian lesions. Atrophic endometrium appeared as a thin echogenic line. The endometrium normally measures 5mm or less in anteroposterior diameter in postmenopausal women. Cases with endometrial thickness more than 5mm were subjected to curettage by Novak curette.⁹⁻¹¹ Curette are introduced and sampling was done. The endometrial specimen was immediately preserved in 10% formalin and sent for histopathological examination.

Statistical Analysis:

The data were collected in file for each patient and then coded and fed to the computer on statistical package for social sciences (SPSS) version 11.0 for statistical analysis. Mean, Standard deviation and prevalence were calculated. Chi square test was done to compare between categorical variables. Paired student’s t-test was done to compare between non-parametric variables.

RESULTS

This study has been conducted on 300 asymptomatic menopausal women. The age of onset of menopause ranging from 55-65 years with a mean of 59.95 years and S.D ± 3.73 years and the years of age since menopause ranging

from 5 -15 years with a mean of 9.95 years and S.D of ± 3.73 .The thickness of the endometrium ranges from 3-8 with a mean of 5.85 mm and S.D ± 0.640 .The body mass index ranges from 21.2 – 46.7Kg/m² with a mean of 28.74 Kg/m² and S.D ± 6 .

Table 1: Clinical data of study group

Item	Mean \pm SD	Range
Age (years)	59.95 \pm 3.73	55 - 65 years
Body Mass Index (Kg/m ²)	28.74 \pm 6	21.2 – 46.7 Kg/m ²
Post menopausal Duration (Years)	9.95 \pm 3.73	5-15 years
Endometrial Thickness (mm)	5.85 \pm 0.640	3 - 8 mm
Parity	3.9 \pm 2	1-8 offsprings

Table 2: Means and standard deviation of endometrial thickness and BMI

Endometrial thickness		Mean \pm SD	t	P
BMI	n			
I- <25	n=13	3.66 \pm 0.71		
II- 25 – 30	n=44	3.45 \pm 0.34	t1= 1.03	>0.05
III- 30- 35	n=143	4.4 \pm 0.47	t2=3.69	<0.05
IV- >35	n=100	5.78 \pm 0.78	t3=10.1	<0.001

t1= group I versus group II.

t2= group I versus group III.

t3= group I versus group IV

Table 3: Correlation coefficient , r, between Endometrial thickness and BMI

Endometrial thickness	R	p
BMI	0.841	<0.001

To find a significance ,we used Chi square test. Chi square = 0.841, p < 0.001. There was highly significant positive correlation between Endometrial thickness and Body Mass Index.

Table 4: Mean+SD of endometrial thickness according to age :

Endometrial thickness	Mean \pm SD	t	P
Age			
55-60 (n=174)	4.94 \pm 0.9	-0.224	<0.01
60-65 (n=126)	4.55 \pm 1.01	-0.224	<0.01

Table 5: Correlation coefficient, r, between Endometrial thickness and Age

Endometrial thickness	R	P
Age	-0.224	<0.05

Chi square = -0.224 . $p < 0.05$.

There was a significantly negative correlation was found between Endometrial thickness and Age.

Table 6: Mean+SD of endometrial thickness according to years since menopause

Endometrial thickness \ Years since menopause	Mean \pm SD	t	P
5-10 (n=174)	4.96 \pm 1.02	-2.84	<0.01
10-15 (n=126)	4.56 \pm 1	-2.84	<0.01

Table 7: Correlation coefficient , r, between Endometrial thickness and Years since menopause

Endometrial thickness	r	P
Years since menopause	-2.84	<0.01

Chi square = -2.84. $p < 0.01$.

There was highly significant negative correlation was found between Endometrial thickness and Years since menopause.

Table 8: Distribution of endometrial thickness and histopathological findings

Endometrial thickness \ Histopathological findings	Out of 12 Cases	%	Mean \pm SD
Atrophic	10	83.3	5.85 \pm 0.75
Chronic endometritis	1	8.33	6.8
Endometrial Polyp	1	8.33	7.3

12 cases in this study had endometrial thickness more than 5mm to whom endometrial sampling was performed with the following results, 10 cases had atrophic Endometrium, one case showed Endometrial Polyp (Endometrial thickness =7.3, BMI =45) and only one case revealed a picture of Chronic endometritis (Endometrial thickness =6.8, BMI =39.7).

Histopathological examination for 12 cases with endometrial thickness more than 5 mm revealed that 10 cases (83.3%) showed atrophic endometrium , one case (8.3%) showed chronic endometritis and one case (8.3%) showed endometrial polyp .

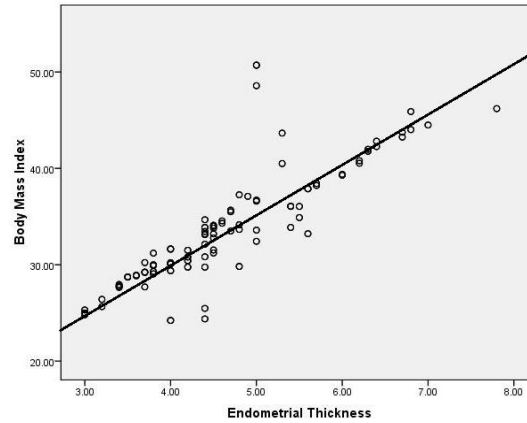


Fig 1: Scatter plot showing the relationship between BMI & endometrial thickness



Fig. (2.a): U/S picture of post menopausal female aged 60 years old, BMI=45 showing thick endometrium about 7.3 mm.

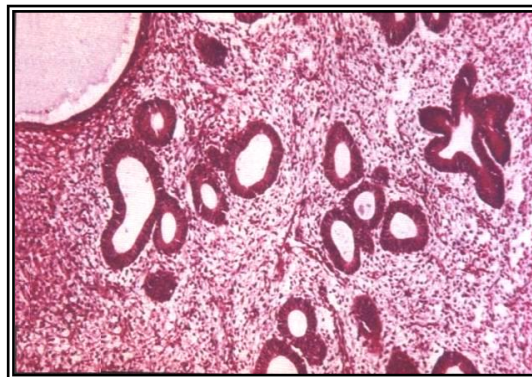


Fig. (2.b): Histopathology of same case showing endometrial Polyp with endometrial glands surrounded by fibrotic stroma containing prominent hyalinized arterioles.



Fig. (3.a): U/S picture of post menopausal female aged 57 years old ,BMI =32.7 showing endometrial thickness = 6.8 mm.

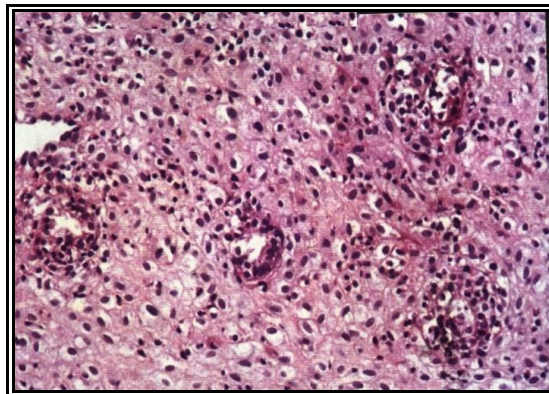


Fig. (3.b): Histopathology of same case showing chronic endometritis show endometrial glands lined by columnar cells and surrounded by stromal cell, many lymphocytes and plasma cells.

DISCUSSION

The endometrial thickness was measured by the use of vaginal ultrasound, endometrial thickness below 5 mm endometrial thickness was used as a cut off value which is the chosen cut off value for our standard upper limit of normal endometrium (Neele et al.,2002). Significant disagreement persists with regard to the relationship between BMI and sonographic endometrial thickness in postmenopausal women.¹² In the present study, it was found that BMI was significantly correlated with endometrial thickness in asymptomatic postmenopausal women. On stepwise multiple regression analysis, BMI was still correlated with endometrial thickness, irrespective of age and years since menopause. This study agrees in part with the report by Andolf et al.,⁷who demonstrated that endometrial thickness correlated with BMI. However, they omitted both

age and years since menopause from their analysis. The observation disagrees with the report by Van den Bosch et al.¹³ which indicated that no significant association could be found between endometrial thickness and weight or BMI, after adjusting for age. They concluded that age is a significant confounder regression analysis. The findings also disagree with those of Tsuda et al.,¹² who reported that BMI showed no correlation with endometrial thickness in Japanese women with normal endometrium, while years since menopause was related to endometrial thickness. However, Van den Bosch et al.,¹³ excluded years since menopause, and Tsuda et al.,¹² excluded age from the analysis. Although age and years since menopause are related variables, it remains unclear whether these two variables have similar effects on endometrial thickness. We consider it is necessary to include

both of these variables in the analysis. We found negative correlation of age or years since menopause with endometrial thickness. Tsuda et al.¹² reported that years since menopause was a significant variable associated with endometrial thickness. They documented that for women less than 5 years since menopause, mean endometrial thickness was significantly greater than that for those more than 5 years from menopause. However, in their study, endometrial thickness did not differ with years since menopause in women more than 5 years on from menopause. There is a report that some but not all postmenopausal ovaries secrete estrogens and androgens.¹⁴ The major source of estrogens in postmenopausal women is peripheral aromatization in adipose tissue. The endometrium is a target organ for estrogens. It appears that sonographic endometrial thickness mainly reflects serum E2 levels.¹⁴ The findings of this study agrees with Dandolu et al.,¹⁵ who reported that body weight and body mass index were higher in women with a thick endometrium independent on age and parity. For every 1-point increase in BMI, there was a 7.56 g increase in uterine weight. Berker al.,¹⁶ demonstrated that there was no statistically significant difference in respect of BMI. When endometrial histopathology was assessed according to endometrial thickness by ultrasonography, in nine of the 75 cases endometrium were greater than 5mm. No statistically significant association was found between BMI and endometrial thickness. Increased prevalence of high BMI is another risk factor for endometrial cancer due to differing hormone levels.¹⁷ Significant association was found between BMI and endometrial thickness in the present study.

CONCLUSION

There is a positive relationship between ultrasonographic endometrial thickness and morphology to body mass index in postmenopausal women.

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