



Analysis of endometrial thickness by age groups in asymptomatic postmenopausal women

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ABSTRACT

Introduction: Endometrial thickness (ET) represents an important ultrasonographic parameter in the assessment of endometrial health in postmenopausal women. Transvaginal ultrasound is currently the standard non-invasive method for evaluating the endometrium, particularly in the context of early detection of pathological changes. The aim of this study was to analyze ET according to age groups in asymptomatic postmenopausal women and to determine whether statistically significant differences exist among the observed age groups.

Methods: A prospective cross-sectional study was conducted at the Department of Gynaecology of the Cazin Primary Health Care Centre from January 01, 2025, to March 31, 2026. The study included 386 postmenopausal women, defined as having an absence of menstruation for at least 12 months. ET was measured by transvaginal ultrasound. Statistical analysis was performed using the Statistical Package for the Social Sciences software (version 27), applying One-way analysis of variance (ANOVA) and Scheffé *post hoc* test.

Results: The mean ET in the total cohort was 6.16 ± 3.62 mm (95% confidence interval: 5.80-6.53), with a range from 1.0 to 21.2 mm. The mean values across age groups were 6.27 mm (45-49 years), 6.35 mm (50-54 years), 6.22 mm (55-59 years), 6.06 mm (60-64 years), and 5.29 mm (≥ 65 years), showing a slight decreasing trend with increasing age. One-way ANOVA did not reveal statistically significant differences among the groups ($F = 0.534$; $p = 0.711$). Scheffé *post hoc* analysis also showed no significant differences among individual age groups ($p > 0.05$).

Conclusions: ET in asymptomatic postmenopausal women shows relatively stable values across different age groups. The results indicate that age alone is not a significant factor influencing ET in this population.

Keywords: Endometrial thickness; postmenopause; transvaginal ultrasound; asymptomatic women; age groups

INTRODUCTION

Endometrial thickness (ET) is a key biomarker for assessing the risk of endometrial abnormalities in postmenopausal women, and transvaginal sonography (TVS) is the basic non-invasive method for identifying endometrial hyperplasia (EH), cancer and for deciding on the need for invasive diagnostic procedures. An increase in ET correlates with a greater likelihood of pathological changes, with the ET threshold dependent on symptoms, age, and risk factors (1). Abnormal uterine bleeding is often the first clinical sign of endometrial pathology, while histopathological analysis remains the main standard of diagnosis (2). Integration of ultrasound findings and clinical data increases diagnostic accuracy and allows early identification of precancerous and malignant lesions (3). Gök et al. ACR and ACOG guidelines recommend a threshold of ET ≤ 4 mm to exclude

endometrial cancer in symptomatic postmenopausal patients, and optimal thresholds for asymptomatic women remain controversial. The risk of malignancy is further modulated by factors such as age, duration of menopause, body mass index (BMI), diabetes, hormonal status, and tamoxifen use (4). The combination of ET, ET/whole uterine wall ratio (ET/uterine wall thickness [UWT]), subcutaneous adipose tissue, and serum estradiol (E2) shows significant diagnostic value in differentiating between benign, precancerous and malignant endometrial changes. EH, as a precursor of endometriosis adenocarcinoma, is caused by chronic exposure to unopposed estrogen and relative lack of progesterone and is classified into benign and atypical forms (EIN), where treatment varies from surveillance and progestin therapy to hysterectomy (5). The increase in the incidence of endometrial cancer in developed countries highlights the importance of early detection and effective screening (6). Despite numerous studies, a universally accepted limit of ET for asymptomatic postmenopausal women still does not exist, and predictive models often do not include all relevant clinical factors, which leads to variations in clinical practice and potentially unnecessary invasive tests (7). This study is aimed at evaluating the influence

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of age on ET in postmenopausal women, with the aim of improving diagnostic protocols and optimizing clinical management.

The aim of this study was to analyze ET according to age groups in asymptomatic postmenopausal women and to assess whether there is a relationship between age and ET values.

METHODS

A prospective cross-sectional study was conducted at the Gynecology Department of the Cazin Health Centre in the period from January 01, 2025, to March 31, 2026. The research included 386 postmenopausal women. Postmenopause is defined as the absence of menstruation for at least 12 months. The respondents were classified into six age groups: ≤ 44 , 45-49, 50-54, 55-59, 60-64, and ≥ 65 years. Asymptomatic women who attended regular gynecological examinations were included in the study. Patients with known endometrial tumors, those receiving hormone therapy, patients with active gynecological infections, and women with postmenopausal bleeding were excluded. Demographic and clinical data were collected for each subject, including age and absence of symptoms, especially postmenopausal bleeding. ET was measured by transvaginal ultrasound according to a standardised protocol. The measurement was carried out in the sagittal plane of the uterus, where the maximum anteroposterior thickness of the endometrium was determined. All ultrasound examinations were performed by the same experienced gynecologist-sonologist using the same ultrasound equipment to reduce interobserver variability. Statistical analysis was performed using the Statistical Package for the Social Sciences software package (version 27). Continuous variables were presented as arithmetic mean \pm standard deviation (SD) with 95% confidence interval (CI). Analysis of variance (ANOVA) was used to compare ET between age groups. For *post hoc* analysis, Scheffé's multiple comparisons and the test of homogeneous subgroups were applied. Statistical significance was determined at the level of $p < 0.05$.

Study is approved by Ethical Committee of Cazin Primary Health Care Centre. All participants signed informed consent. All participants signed an informed consent and agreed to participate in the study.

RESULTS

A total of 386 respondents participated in the study, divided into five age groups: 45-49 years ($n = 12$), 50-54 years ($n = 115$), 55-59 years ($n = 176$), 60-64 years ($n = 53$), and ≥ 65 years ($n = 30$). The average ET in the total sample was 6.16 ± 3.62 mm (mean \pm SD). Descriptive analysis

(Table 1) showed that the highest average ET was recorded in the age group 50-54 years (6.35 ± 3.80 mm), while the lowest average value was measured in the group of subjects older than 65 years (5.29 ± 3.62 mm). The SD indicated a relatively large variability of values within individual age groups. The other age groups had mean values ranging from 6.06 to 6.27 mm. The minimum and maximum values within the groups indicated significant individual variability, with minimum values of 1.0 mm and maximum values of up to 21.2 mm. The 95% CIs indicate that the mean values among the age groups overlap considerably, suggesting that the differences among the groups are probably not statistically significant.

One-way ANOVA (Table 2) was used to assess differences in mean ET between age groups. The results show that there is no statistically significant difference between age groups ($F = 0.534$; $p = 0.711$). A $p > 0.05$ indicates that the differences in mean ET values between the observed age groups are not statistically significant, that is, age in this sample does not have a significant effect on ET.

Post hoc Scheffé test (Table 3) was applied to examine in more detail the differences among individual age groups. The results show that none of the comparisons among the groups were statistically significant ($p > 0.05$). The largest difference in mean values was observed between the age groups ≥ 65 years and 50-54 years (1.06 mm), but this difference was also not statistically significant. The CIs for all pairs of groups encompass the zero value, which further confirms the absence of statistically significant differences.

The analysis of homogeneous subgroups (Table 4) shows that all age groups are within one homogeneous subgroup, meaning that there are no statistically significant differences in the average ET among them ($p = 0.840$). This confirms the result of the ANOVA analysis and indicates that the average values of ET are statistically similar among all age groups.

The visual presentation of the data (Figure 1) shows the average ET in different age groups of the subjects. The highest average value was recorded in the age group 50-54 years (6.35 mm). After that, a slight decrease in the average values is observed in the age groups 55-59 years (6.22 mm) and 60-64 years (6.06 mm). The lowest average value of ET was recorded in the age group ≥ 65 years (5.29 mm). Overall, a trend of a slight decrease in ET with increasing age can be observed, especially after the age of 60. In summary, the results of this study indicate that, although a trend of a slight decrease in ET with aging can be observed, this difference is not statistically significant. This may be a consequence of high individual variability, a relatively small number of subjects in some age groups, or specific characteristics of the sample. Further studies with larger

TABLE 1. Descriptive statistics of endometrial thickness by age group

Age group	N	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Min	Max
45-49	12	2.3422	0.6761	4.778	7.755	2.8	10.0
50-54	115	3.8033	0.3547	5.644	7.050	1.2	20.0
55-59	176	3.6150	0.2725	5.679	6.755	1.4	21.2
60-64	53	3.5270	0.4845	5.086	7.030	1.3	16.2
≥ 65	30	3.6159	0.6602	3.936	6.637	1.0	14.6
Total	386	3.6219	0.1843	5.801	6.526	1.0	21.2

95% Confidence Interval for Mean

samples and additional factors could further shed light on this connection.

DISCUSSION

The results of this research showed that the average thickness of the endometrium in asymptomatic postmenopausal women was 6.16 ± 3.62 mm, and no statistically significant difference was found between the analysed age groups. Although a slight trend of decreasing ET with increasing age was observed, ANOVA analysis did not confirm the statistical significance of these differences ($p = 0.711$). These findings suggest that age alone within the postmenopausal population is not a significant predictor of ET variation in

asymptomatic women. The obtained results are in accordance with previous research, which emphasizes that the thickness of the endometrium can show significant individual variability even in the absence of clinical symptoms, and that the values measured by ultrasound should be interpreted in the context of the overall clinical picture (8). TVS is considered a reliable and widely used method for the assessment of the endometrium, especially in the initial screening of postmenopausal women, because it enables a non-invasive assessment of the morphology and thickness of the endometrium. However, several studies emphasize that the value of ET alone is not sufficient to assess the risk of pathology, but it is necessary to take into account clinical factors such as postmenopausal bleeding, metabolic comorbidities, and hormonal status (9). In this study, the highest average value of ET was recorded in the age group 50-54 years, while the lowest was recorded in the group ≥ 65 years. Although this finding suggests a slight tendency for ET to decrease with increasing age, statistical analysis showed that these differences were not significant. Similar results are reported by other studies, which point out that after entering postmenopause, there is a stabilization of ET, where age in itself is not a dominant factor of change. A large SD and a wide range of values in all age groups in this study indicate pronounced individual variability of ET. Such variability may be due to various biological and metabolic factors, including body mass, estrogen levels, duration of menopause, or the use of certain medications. Previous studies have shown that the combination of ultrasound parameters, such as the ratio of ET/UWT, together with laboratory markers, can improve the diagnostic accuracy in distinguishing between benign and malignant changes. It is important to emphasize that clinical thresholds for ET differ depending on the presence of symptoms. Professional association guidelines recommend a threshold of ≤ 4 mm to rule out endometrial cancer in women with postmenopausal

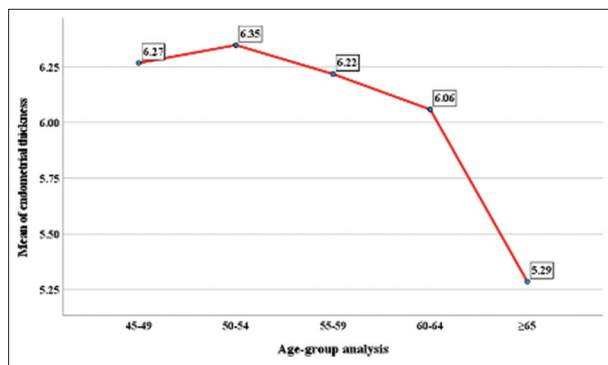


FIGURE 1. Average endometrial thickness according to age groups of respondents.

TABLE 2. ANOVA analysis of differences in endometrial thickness between age groups

Variations	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	28.154	4	7.039	0.534	0.711
Within Groups	5022.317	381	13.182		
Total	5050.471	385			

TABLE 3. Post hoc Scheffe test for comparing endometrial thickness between age groups

Age groups (I)	Age groups (J)	Mean Difference (I-J)	Std. Error SE	Sig. α	95% Confidence Interval	
					Lower Bound	Upper Bound
45-49	50-54	-0.0803	1.1014	1.000	-3.490	3.329
	55-59	0.0496	1.0832	1.000	-3.303	3.403
	60-64	0.2084	1.1607	1.000	-3.384	3.801
	≥ 65	0.9800	1.2401	0.960	-2.859	4.819
50-54	45-49	0.0803	1.1014	1.000	-3.329	2.490
	55-59	0.1299	0.4353	0.999	-1.218	1.477
	60-64	0.2887	0.6028	0.994	-1.577	2.154
	≥ 65	1.0603	0.7443	0.730	-1.244	3.364
55-59	45-49	-0.0496	1.0832	1.000	-3.403	3.303
	50-54	-0.1299	0.4353	0.999	-1.477	1.218
	60-64	0.1587	0.5689	0.999	-1.602	1.902
	≥ 65	0.9304	0.7171	0.794	-1.289	3.150
60-64	45-49	-0.2084	1.1607	1.000	-3.801	3.384
	50-54	-0.2887	0.6028	0.994	-2.154	1.577
	55-59	-0.1587	0.5689	0.999	-1.920	1.602
	≥ 65	0.7716	0.8295	0.929	-1.796	3.339
≥ 65	45-49	-0.9800	1.2401	0.960	-4.819	2.859
	50-54	-1.0603	0.7443	0.730	-3.364	1.244
	55-59	-0.9304	0.7171	0.794	-3.150	1.289
	60-64	-0.7716	0.8295	0.929	-3.339	1.796

TABLE 4. Homogeneous subgroups of age groups according to endometrial thickness (Scheffé test, $\alpha = 0.05$)

Age-group analysis	Scheffe ^{a,b}	
	N	Subset for $\alpha = 0.05$
≥65	30	5.287
60–64	53	6.058
55–59	176	6.217
45–49	12	6.267
50–54	115	6.347
Sig.		0.840

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size=33.353.

b. The group size is unequal. The harmonic mean of the group size is used. Type I error levels are not guaranteed

bleeding (10). However, in asymptomatic women, the optimal cut-off value is still not clearly defined, which may lead to variations in the clinical approach and potentially unnecessary invasive diagnostic procedures (11). The results of this research additionally confirm that age alone should not be a decisive factor in the interpretation of ET findings in asymptomatic women. This research also has certain limitations. First of all, although the total sample is relatively large, certain age groups, especially the youngest and oldest, had a smaller number of respondents, which may affect the statistical power of the analysis. Furthermore, the study did not analyze additional clinical factors such as BMI, duration of menopause, or metabolic comorbidities, which can have a significant impact on ET. On the other hand, the advantage of this research is the prospective design and standardized ultrasound measurement performed by the same experienced sonologist, which reduced interobserver variability. Ultimately, the results of this study confirm that ET in asymptomatic postmenopausal women does not differ significantly between age groups. Therefore, the interpretation of ultrasound findings should be based primarily on clinical symptoms and individual risk factors, and not exclusively on the patient's chronological age (12). Further studies involving larger populations and additional clinical parameters could contribute to a more precise definition of ET reference values in the asymptomatic postmenopausal population.

CONCLUSION

ET in asymptomatic postmenopausal women is relatively stable and does not show significant differences between age groups. Age in itself is not a decisive predictor of ET; therefore, the decision on invasive diagnostics should include clinical factors. Transvaginal ultrasound assessment, combined with clinical data, enables reliable risk assessment and reduces the need for unnecessary invasive examinations.

RECOMMENDATIONS

When assessing the risk of endometrial lesions in asymptomatic postmenopausal women, a combination of transvaginal ultrasound and clinical factors such as BMI, diabetes, and hormonal status is recommended. Age in itself should not be the only criterion for invasive diagnostics. Following local ET reference values and applying standardized screening protocols is recommended.

DECLARATION OF INTERESTS

Authors declare no conflict of interests

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