Sonographic Findings of Uterus and Ovaries in Normal Pre- and Post-menopausal Women

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Abstract

To investigate the significant findings of ultrasonography before hormonal replacement therapy (HRT) was given in normal pre- and post-menopausal women. Sixty eight Thai pre- and post-menopausal women with no previous HRT were recruited into the study. They were divided into 22 pre-menopausal women (group I), 28 post-menopausal women of ≤ 5 years (group II) and 18 post-menopausal women of > 5 years (group III). Their mean age was 48.2, 50.2 and 57.3 years, respectively. Myoma uteri was found in 10 (45.5%), 2 (7.1%) and 1 (5.6%) in group I, II and III. There were 2 (9.1%), 3 (10.7%), 3 (16.7%) cases of ovarian tumor in these three groups respectively. The detection rate of ovaries from ultrasound was 90.7 per cent in group I, 89.1 per cent in group II and III. The corpus to cervix ratio in the three groups was 2.3, 2.4 and 2.3, respectively. Uterine volume in nulliparous and multiparous pre-menopausal women was 56.6 ml and 74.2 ml, but in group II and III were 60.1 ml and 37.1 ml respectively. Endometrial thickness was significantly different in group I, II and III (7.2, 4 and 2.9 mm.) Left and right ovarian volume of group I was significantly larger than that of group II and group III. In conclusion, the ultrasonography is highly recommended to detect uterine and ovarian abnormalities before HRT is given in pre- and post-menopausal women.

The geriatric population is constantly growing in number every year, especially in developed countries. Normal values of ovarian and uterine sizes in these groups are needed for early detection of any abnormalities in this population.

As girls grow up the uterine size becomes larger, but in adulthood the uterine size is found to be parity related and not age related[1]. Since changes in uterine size were observed according to the menstrual cycle[2], its size in the post-meno-

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pausal period would be smaller compared to the pre-menopausal period. Merz E, et al showed the reduction in uterine size was related to the years after menopause[3].

Ovaries, likewise, are observed in changing morphology at the age of 7-9 years[4]. After menopause, there was an obvious reduction in ovarian volume[3].

We, therefore, conducted this study to obtain the normal values of uterine and ovarian sizes, as well as corpus to cervix ratio in normal pre- and post-menopausal Thai women.

MATERIAL AND METHOD

Sixty eight pre-and post-menopausal women without previous hormonal replacement therapy, attending the Menopausal Clinic from October 1995 to April 1996 at Ramathibodi Hospital, Bangkok, Thailand were divided in 22 pre-menopausal women (group I), 28 post-menopausal women of $\leq$ 5 years (group II) and 18 post-menopausal women of > 5 years (group III). ATL colour doppler ultrasonographic equipment model Ultramark 9 HDI 5 MHz with transvaginal probe was used for the study.

All women had normal vaginal examination findings before ultrasonography study. After emptying the bladder, transvaginal ultrasonography was performed in all participants. Uterine length was the sum of corpus plus cervix which were measured separately. The length and heights of corpus and cervix uteri were measured in the sagittal section and the maximal width of corpus and cervix in the coronal section. The length of the ovaries was measured in an oblique sagittal section, the width and the height of the ovaries were measured in the coronal section after a 90° rotation of the transducer. The ovarian volume was calculated by using the formula for a prolate ellipsoid:

$$V = 4/3 \times 3.14 \times (d1/2 \times d2/2 \times d3/2)$$

Endometrial thickness, likewise, was measured in the sagittal section.

Statistical analysis

The difference of the volume was calculated by Kruskal - Wallis 1-way Anova analysis of variance where $p < 0.05$ was considered significant. For exception, the occurrence of being myoma uteri was testified between the pre-menopausal group (gr I) and the post-menopausal group (gr II+III) by Fisher's Exact test where $p < 0.05$ was considered significant.

RESULTS

Age in group III was significantly higher than the other two groups. Endometrium thickness in group II and III was significantly thinner than group I. Ovarian volume of group II and group III was significantly less than that of group I (Table 1). The detection rate of ovaries was 90.7 per cent in group I and 89.1 per cent in group II and III.

There was no sigificant difference of corpus to cervix ratio among the three groups (Table 2). Uterine volume of subjects classified by parity status showed no significant difference among the three groups (Table 3).

Table 4 demonstrates the occurrence of myoma uteri and ovarian cyst among the three groups. There was significant difference in the prevalence of myoma uteri in group I compared to group II and III but there was no significant difference in the prevalence of ovarian cyst in these study groups.

Table 1. Characteristics of the subjects, endometrium thickness and ovarian volumes expressed as Mean ± SD.

	Pre-menopause (gr I)	Post-menopause ≤ 5 years (gr II)	Post-menopause > 5 years (gr III)
Age (year)	48.2 ± 3.3[a]	50.2 ± 3.8[a]	57.3 ± 3.9[b]
Endometrium thickness (mm)	7.2 ± 3.2[a]	4.0 ± 1.9[b]	2.9 ± 1.1[b]
Ovarian volume (ml)			
Left	5.9 ± 4.2[a]	2.6 ± 2.7[b]	1.7 ± 1.5[b]
Right	5.2 ± 4.1[a]	3.0 ± 2.6[b]	1.5 ± 0.8[b]

a, b : Significant difference among the 3 groups ($p < 0.05$).

Table 2. Corpus to cervix ratio of subjects grouped by the parity status expressed as Mean ± SD.

	Pre-menopause (gr I)	Post-menopause ≤ 5 years (gr II)	Post-menopause > 5 years (gr III)
Nulliparous	2.2 ± 0.6	2.6 ± 0.3	3.9
Multiparous	2.3 ± 0.7	2.4 ± 0.8	2.1 ± 0.4
Total	2.3 ± 0.6	2.4 ± 0.7	2.3 ± 0.7

Table 3. Uterine volume of subjects grouped by the parity status expressed as Mean ± SD.

	Pre-menopause (gr I)	Post-menopause ≤ 5 years (gr II)	Post-menopause > 5 years (gr III)
Nulliparous	56.5 ± 32.9	61.9 ± 31.8	12.4 ± 2.7
Multiparous	74.2 ± 28.6	59.7 ± 29.5	40.4 ± 15.2
Total	65.4 ± 30.8[a]	60.1 ± 29.3[a]	37.1 ± 16.9[b]

a,b : The difference letters indicate the difference of mean between groups. (ANOVA, $p < 0.05$)

Table 4. Occurrence of myoma and ovarian cyst in the subjects classified according to their menopausal status.

	Pre-menopause (gr I)	Post-menopause ≤ 5 years (gr II)	Post-menopause > 5 years (gr III)
Number of subjects	22	28	18
Myoma	45.5%*	7.1%	5.6%
Ovarian cyst	9.1%	10.7%	16.7%

* Significant difference between pre-menopouse (gr. I) and post-menopause (gr II + III) where $p < 0.05$.

DISCUSSION

Transvaginal ultrasonography when compared with transabdominal pelvic ultrasonography, provides improved resolution for visualization of female pelvic organs with less artifact(4).

Campbell et al, using a transabdominal ultrasonic probe, showed that ovarian size and its morphology in climacteric and post-menopausal women was 4.33 cm^3 ± 1.91 (SD) with no correlation between either right or left ovarian volume in years after menopause(5). Visualization of ovaries by transvaginal ultrasonography is usually done after emptying the bladder. Pardo J et al introduced a transvagival examination performed with a partially full bladder and with this technique, he claimed that ovaries could be detected up to 93.5 per cent, compared to about 90 per cent detection rate in our study(6).

Using this technique, normal values of ovarian size and volume in pre- and post-menopausal women can be established. Tepper R et al recommended that by establishing the normal baseline values for ovaries, it would assist physicians to pick up the abnormal ones and with the advancement of this technique, lengths and sizes of uterus and ovary are better evaluated(7). Post-menopausal periods, especially after 5 years, uterine and ovarian size decreased markedly which also showed in the results of our study.

The endometrial thickness measured in the pre-menopausal women confirmed the data published by Merz E et al and Bakos O et al[2,8]. The endometrial tissue showed hormone - related changing during the post-menopausal years and the endometrial thickness would decline to values of 5 mm or below[2] which was the same as in our study. Cullinan JA et al published a new technique using sonohysterography to evaluate the endometrial thickness[9]. This technique is most useful for evaluating women with fertility problems, post-menopausal bleeding, or an abnormal endometrial interface as seen from baseline sonography.

Transvaginal ultrasonography is gaining popularity as a screening test for ovarian and uterine tumors[10-13]. In this study, we detected myoma uteri and ovarian cysts in asymptomatic pre- and post-menopausal women in their first visit care. Each center should be familiar with this technique and should have their own normal values of ovarian and uterine findings in order to detect the abnormal values when confronted. Some even recommend that this technique should be routinely performed in every climacteric woman before HRT is given[14].

In conclusion, transvaginal ultrasonography performed in pre- and post-menopausal women before the hormonal replacement therapy found that the ovarian and uterine volume, as well as endometrial thickness is lower in the post-menopausal period. Myoma and ovarian cysts were detected apart from routine vaginal examination. It is recommended that ultrasonography should be firstly carried out in every pre and post-menopausal woman before further treatments is considered.

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การศึกษามดลูกและรังไข่ด้วยคลื่นเสียงความถี่สูงในสตรีวัยก่อนและหลังหมดระดู

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คณะผู้ทำการวิจัยได้ศึกษาลักษณะมดลูกและรังไข่ในสตรีวัยก่อนหมดระดูและสตรีวัยหมดระดูจำนวน 68 คน ก่อนที่จะให้การรักษาด้วยฮอร์โมนทดแทน โดยวิธีการตรวจด้วยคลื่นเสียงความถี่สูงทางช่องคลอด ได้แบ่งกลุ่มศึกษาออกเป็น 3 กลุ่ม คือ กลุ่มที่ 1 (สตรีวัยก่อนหมดระดู) จำนวน 22 คน กลุ่มที่ 2 (สตรีวัยหมดระดูเท่ากับหรือน้อยกว่า 5 ปี) จำนวน 28 คน และกลุ่มที่ 3 (สตรีหลังหมดระดูมากกว่า 5 ปี) จำนวน 18 คน พบก้อนทูมของมดลูกจำนวนร้อยละ 45.5, 7.1 และ 5.6 ในกลุ่มที่ 1, 2 และ 3 ตามลำดับ พบก้อนทูมของรังไข่เป็นจำนวนร้อยละ 9.1, 10.7 และ 16.7 ในกลุ่มที่ 1, 2 และ 3 ตามลำดับ การตรวจพบรังไข่จากการตรวจด้วยคลื่นเสียงความถี่สูงพบได้ร้อยละ 90.7 ในกลุ่มที่ 1 และร้อยละ 89.1 ในกลุ่มที่ 2 และ 3 ตามลำดับ อัตราส่วนของความยาวมดลูกต่อความยาวคอมดลูกในกลุ่มที่ 1, 2 และ 3 เท่ากับ 2.3, 2.4 และ 2.3 ตามลำดับ ปริมาตรของมดลูกในสตรีก่อนหมดระดูที่ไม่เคยมีบุตรและเคยมีบุตรในกลุ่มที่ 1 เท่ากับ 56.6 และ 74.2 มล.ตามลำดับ ปริมาตรของมดลูกในสตรีหลังหมดระดูในกลุ่มที่ 2 และ 3 เท่ากับ 60.1 และ 37.1 มล.ตามลำดับ ความหนาของเยื่อบุโพรงมดลูก ในกลุ่มที่ 1, 2 และ 3 เท่ากับ 7.2, 4 และ 2.9 มม. ตามลำดับ ปริมาตรของรังไข่ในสตรีวัยก่อนหมดระดูจะมากกว่าในกลุ่มที่ 2 และ 3 อย่างมีนัยสำคัญ โดยสรุปการตรวจคลื่นเสียงความถี่สูงในสตรีวัยก่อนและหลังวัยหมดระดูก่อนที่จะให้การรักษาด้วยฮอร์โมนทดแทนมีประโยชน์ สามารถตรวจพบความผิดปกติได้จำนวนพอสมควรและยังมาเป็นข้อมูลสำหรับการติดตามในระยะต่อไป

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