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Comparison of bone mineral density in perimenopausal women with surgical menopausal women: Analytical cross sectional study

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Abstract
Aim: Comparison of bone mineral density (BMD) in perimenopausal women with surgical menopausal women.
Methods: The present analytical cross sectional study was conducted on patients (out patients and in patients) in Department of Obstetrics and Gynecology, Kamla Nehru Hospital, attached to IGMC Shimla. Group 1 (N=60): Perimenopausal women aged 40-45years as control. Group 2 (N=60): Women who had undergone hysterectomy with bilateral salphingoophorectomy at least 6 month ago. BMD measurements were measured by whole body dual energy X-ray absorptiometery (DEXA), with the help of Hologic Discovery QDR machine available in department of radiology.
Results: In the present study the mean age of post-surgical menopausal group was 46.0 years and in the perimenopausal group the mean age was 42.4 years. Mean parity in post-surgical menopausal group was 3.03 and 2.5 in the perimenopausal group.
Conclusions: The prevalence of osteoporosis is very high in this part of India. Both perimenopausal and post-surgical menopausal women have lower levels of BMD. Bone mineral density (BMD) can be taken as a useful marker to assess and treat osteoporosis and also to prevent complications in post-menopausal women.

Keywords: Postmenopausal women, Osteoporosis, Bone mineral density

Introduction
The word menopause is derived from the greek words “meno” means month and “pause” to stop [1]. Menopause is defined as permanent cessation of menses resulting from reduced ovarian hormone secretion that occurs naturally or is induced by surgery [2].
Osteoporosis is an important public health problem in older women. It is more common in postmenopausal women giving rise to morbidity and markedly affecting the quality of the life in this population. Menopause is associated with endocrinological changes and alteration in bone and mineral metabolism [3].
At menopause the ovarian follicles lose their function and thus results in decreased production of estradiol and other hormones. The decreased levels of oestrogen leads to more osteoclast formation and ultimately enhancing bone resorption, which inturn leads to loss of bone density and destroys the architecture resulting in osteoporosis [4].
Reduced ovarian hormone secretion is mainly suggested by early development of osteoporosis in women who attained premature menopause either due to natural or surgical causes [5]. In surgically induced menopause, decreased estrogen is secondary to the total loss of ovarian function while in natural menopause it is secondary to a multifactorial phenomenon [6].
The current gold standard in the diagnosis of osteoporosis is dual X -ray absorptiometry (DEXA) which can assess the mineral content of the whole skeleton as well as of sites vulnerable to fragility fracture. DEXA is the most developed, the most studied, and the most biologically validated diagnostic modality. DEXA is a non-invasive, painless method of attempting to assess bone strength, involving exposure to radiation amounting to 10% of that of an X- ray. Two X-rays are used to measure bone mineral content (BMC), that is the amount of mineral detected in grams, this is then divided by the area measured to give grams per centimetre squared (g/cm^2) or bone mineral density (BMD) [7]. Very few studies have been conducted to see the effect of sudden decrease and early onset of decreased oestrogen

Levels (Endocrinological changes) associated with surgical menopause on bone mineral density (BMD) in north Indian women. Hence the present study is aimed at comparing the levels of bone mineral density of surgical and perimenopausal women of north Indian.

Materials and methods

The present analytical cross sectional study was conducted on patients (out patients and in patients) in Department of Obstetrics and Gynecology, Kamla Nehru Hospital, attached to IGMC Shimla.

Ethical approval and Informed consent

The study protocol was reviewed by the Ethical Committee of the Hospital and granted ethical clearance. After explaining the purpose and details of the study, a written informed consent was obtained.

Inclusion criteria

- Women who had undergone hysterectomy with bilateral salphingoophorectomy at least 6 month ago.
- Women who have attained natural menopause at least 1 year ago
- Women who had signed the informed consent

Exclusion Criteria

- Women on HRT therapy
- Women with other endocrine and metabolic disease which affect bone density
- Chronic use of drugs such as steroid therapy

Grouping

Group 1 (N=60): Perimenopausal women aged 40-45years as control.

Group 2 (N=60): Women who had undergone hysterectomy with bilateral salphingoophorectomy at least 6 month ago.

Methodology

BMD measurements were measured by whole body dual energy X-ray absorptiometry (DEXA), with the help of Hologic Discovery QDR machine available in department of radiology. DEXA scan is a quick and painless procedure that involves lying in supine position on X-ray table. As the scanning arm is moved slowly over body, a narrow beam of X-ray will be passed through the part of body to be examined. Scan takes around 6-7 minutes. A DEXA scan compares bone density of individual with the bone density expected for a young healthy adult (T-score) or a healthy adult of same age and gender (Z-score). The results will be mapped according to T-score and bone mineral density is measured in g/cm square.

Statistical Analysis

The recorded data was compiled and entered in a spreadsheet computer program (Microsoft Excel 2010) and then exported to data editor page of SPSS version 20 (SPSS Inc., Chicago, Illinois, USA).

Descriptive statistics included computation of percentages, means and standard deviations were calculated. The statistical tests applied for the analysis was chi-square test and student t-test. For both the tests, confidence interval and p-value were set at 95% and ≤ 0.05 respectively.

Results

Table 1: comparison of mean age between the study populations

Variables	Perimenopausal (n = 60)	Post-surgical Menopausal (n=60)
Mean age	44.20	46.00
Mean Parity	2.5	3.03
p-value	>0.05	

Test applied: student t-test

Table 2: comparison of BMI between the study groups

BMI	Perimenopausal women (n =60)	Postsurgical menopausal (n =60)
< 18.5 (Underweight)	6 (10%)	0
18.5-24.9 (Normal)	33 (55.0%)	22 (36.6%)
25- 29.9 (Overweight)	17 (28.3%)	28 (46.6%)
>30 (Obese)	4 (6.7%)	10 (16.6%)
p-value	>0.05 (NS)	

Test applied: Chi-square test

Table 3: shows distribution of women according to BMD in comparison groups

BMD	Perimenopausal women (n =60)	Postsurgical menopausal (n =60)
<1.108 g/cm2	10(16.7%)	37(61.7%)
1.108 g/cm2	9(15.0%)	5(8.3%)
>1.108g/cm2	41(68.3%)	18(30.0%)
p-value	<0.05 (Sig.)	

Test applied: chi-square test

Table 4: Shows distribution of women according to T-score in comparison groups

T- score	Perimenopausal women (n =60)	Postsurgical menopausal (n =60)
> - 1.0 (Normal)	50(83.3%)	40(66.7%)
-2.5 to -1.0(Osteopenia)	10(16.7%)	16(26.7%)
< - 2.5 (Osteoporosis)	0	4 (6.7%)
p-value	>0.05 (NS)	

Test applied: chi-square test

Discussion

In the present study, 120 women were included having natural menopause, surgical menopause and perimenopausal group, attending the OPD of Obstetrics and Gynaecology department of Kamla Nehru Hospital for Mother and Child attached to Indira Gandhi Medical College, Shimla.

These patients were evaluated for serum calcium, magnesium and phosphorus.

Even though studies on serum calcium, magnesium and phosphorus in menopausal and perimenopausal status have been conducted in various countries but still there is limited data available in our population for the bone mineral density analysis, hence this study was undertaken. It is fact the world population is getting older, this issue brought osteoporosis to the attention as it is known to be the disease of elderly. It increases morbidity among menopausal women.

We studied the post-surgical menopausal women 6 months earlier as compared to the perimenopausal women for early detection of decreased levels of serum minerals in them so that we can treat them earlier and prevent osteoporosis in them.

In perimenopausal group of our study T- score is not similar to that of Sasmita *et al*. [8] and post-surgical menopausal group of present study T- score is almost similar to Kamineni V *et al*. [9] study.

In our study the more negative T score observed in the post-surgical menopausal women compare to perimenopausal women could be also due to the additive effect of aging apart from the postmenopausal status. Bone dissolves and is absorbed faster than the formation of new bone leading to thinner bones because of sudden decrease in estrogens as a result of menopause and also as a natural part of aging. Moreover, there is greater reabsorption of Ca and phosphorous from the bones and a decrease in bone matrix. T-score of postsurgical menopausal women was more negative than natural menopausal women although it was not statically significant could be due to the physical inactivity that was reported in the post-surgical menopausal women also may play an additional role. The other reasons can be racial, geographical or socio economic factors.

Conclusion

The prevalence of osteoporosis is very high in this part of India. Both perimenopausal and post- surgical menopausal women have lower levels of BMD. Bone mineral density (BMD) can be taken as a useful marker to assess and treat osteoporosis and also to prevent complications in post-menopausal wome

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