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Bone mineral density levels in natural menopausal women and surgical menopausal women: A comparative study

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Abstract
Aim: comparison of bone mineral density levels in natural menopausal 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): Women who had undergone hysterectomy with bilateral salphingoophorectomy at least 6 month ago. Group 2 (N=60): Women who have attained natural menopause at least 1 year 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 maximum number of the patients 26 (43.3%) were in the age group of 46-50 years for the post surgical menopausal group and in the natural menopausal group maximum number of the patients were in the age group of 51-55 years 23 (38.3%). Maximum numbers of patients are multiparous in both groups. Total number of women having BMD less than 1.108 g/cm^2 was 55 in which 18 were natural menopausal and 37 were postsurgical menopausal (p<0.05).
Conclusions: Both natural 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
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 [1].
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 [2].
Decreased estrogen also affects the serum and urinary level of calcium, and magnesium indirectly at various levels. Decreased estrogen also alters the intestinal absorption, bone resorption and renal reabsorption of calcium, magnesium and phosphate [3].
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 [4]. 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 [5].
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) [6].
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 natural menopausal women of north Indian women.

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
- Chronic use of drugs such as steroid therapy

Grouping

Group 1: Women who have attained natural menopause at least 1 year ago

Group 2: 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 absorptiometery (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. For both the tests, confidence interval and p-value were set at 95% and ≤ 0.05 respectively.

Results

Table 1: Shows distribution of women according to age in comparison groups

Age	Natural menopausal women	Post surgical menopausal women
40- 45 years	0	25 (41.66%)
46- 50 years	19 (31.7%)	26 (43.3%)
51 – 55 years	23 (38.3%)	9 (15%)
56-60 years	13 (21.7%)	0
61-65 years	3 (5%)	0
>65 years	2 (3.3%)	0
Total	60	60
Mean Age	53.40	46.00
Mean Age at Menopause	48.87	47.09

Test applied: chi-square test, $p \leq 0.05$ Significant

Table 2: Shows distribution of women according to parity in comparison groups

Parity	Natural menopausal women	Post surgical menopausal women
Nulliparous	1 (1.0%)	2 (3.0%)
Primipara	4 (6.0%)	6 (10%)
Multipara	28(46.7%)	34 (56.7%)
Grandmultipara	27(45%)	18 (30%)
Total	60	60
p-value	0.001 (Sig.)	

Test applied: chi-square test

Table 3: Shows distribution of women according to BMI in comparison groups

BMI	Natural menopausal women	Post surgical menopausal women
< 18.5 (Underweight)	1 (1.7%)	0
18.5-24.9 (Normal)	27(45.0%)	22(36.6%)
25- 29.9 (Overweight)	28(46.6%)	28(46.6%)
>30 (0bese)	4 (6.7%)	10 (16.6%)
Total	60	60
p-value	0.002 (Sig.)	

Test applied: chi-square test

Table 4: Shows distribution of women according to BMD in comparison groups

BMD	Natural menopausal women	Postsurgical menopausal women
<1.108 g/cm2	18(30.0%)	37(61.7%)
1.108 g/cm2	2(3.3%)	5(8.3%)
>1.108g/cm2	40(66.7%)	18(30.0%)
Total	60	60
p-value	0.001 (Sig.)	

Test applied: chi-square test

Table 5: Shows distribution of women according to T-score in comparison groups

T- score	Natural menopausal women	Post surgical menopausal women
> - 1.0 (Normal)	40(66.7%)	40(66.7%)
-2.5 to -1.0 (Osteopenia)	15(25.0%)	16(26.7%)
< - 2.5 (Osteoporosis)	5 (8.3%)	4 (6.7%)
Total	60	60
p-value	0.102 (NS)	

Test applied: chi-square test

Discussion

In the present study, 120 women were included having natural menopause and surgical menopausal 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 phosphorus in menopausal status have been conducted in various countries but still there is limited data available in our population 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 natural menopausal women for early detection of decreased levels of serum phosphorus so that we can treat them earlier and prevent osteoporosis in them.

In natural menopausal group of present study T -score is almost similar to Najlaa *et al.* [7] study. Results observed in Kamineni V *et al.* [8] and Sasmita *et al.* [9] study was not identical with our study. In post surgical menopausal group of present study T-score is almost similar to Kamineni V *et al.* [8] study. 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 socioeconomical factors.

Conclusion

The prevalence of osteoporosis is very high in this part of India. Both natural 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.

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