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Serum calcium levels in natural menopausal women and surgical menopausal women: a comparative study

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Abstract
Aim: comparison of serum calcium 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. Serum calcium was estimated by Arsenazo colorimetric method in mg/dl after the relevant quality control checks.
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 hypocalcemia 15 (23.7%) were natural menopausal and 18 (30.0%) were postsurgical menopausal. No women had hypercalcemia.
Conclusions: The prevalence of osteoporosis is very high in this part of India. Both natural and post-surgical menopausal women have lower levels of serum calcium.

Keywords: Postmenopausal women, Osteoporosis, Serum calcium

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].
At menopause the ovarian follicles lose their function and thus results in decreased production of estradiol and other hormones. Decreased estrogen also affects the serum and urinary level of calcium indirectly at various levels. Decreased estrogen also alters the intestinal absorption, bone resorption and renal reabsorption of calcium [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]. All the changes take gradual course of time after natural onset of menopause.
However after surgical menopause the blood supply to the ovaries are affected, thus the women who have surgical menopause at early age have changes in their endocrinological status early and attain menopause 3.7 years earlier than the women who attain the natural menopause. The onset of endocrinological changes after surgical menopause is very sudden unlike natural menopause.
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 serum levels of calcium in north Indian women. Hence the present study is aimed at comparing and treating the levels of calcium among perimenopausal women, 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 Salpingoophorectomy 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
- Women suffering from other bone disorder like osteomalacia which affect calcium levels
- 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
Blood samples of all patients were collected in a plain vacutainer tubes under all aseptic precautions. Serum was separated after twenty minutes of collection by centrifuging the sample. After that serum was stored in a vial at 4 degree celsius. All the estimations were done within two days of storage by fully automated chemistry autoanalyser. Serum calcium was estimated by Arsenazo colorimetric method in mg/dl after the relevant quality control checks.

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 ≤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 calcium levels in comparison groups

Serum calcium level	Natural menopausal women	Post surgical menopausal women
< 8.10 mg/dl (Hypocalcemia)	15(23.7%)	18(30.0%)
8.10-10.4 mg/dl (Normal range)	45(76.3%)	42(70.0%)
>10.4 mg/dl (Hypercalcemia)	0	0
Total	60	60
p-value	P=0.086 (NS)	

Test applied: chi-square test

Discussion
In the present study, 180 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 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 calcium so that we can treat them earlier and prevent osteoporosis in them.
In natural menopausal group of present study mean serum calcium level is are similar to the study conducted by A. L. Manohari *et al.* [4]. and Sasmita *et al.* [5]
In our study there is no increase in the postmenopausal serum calcium level the number of patients included was mostly below the age of 65 years. These findings are explained by the following: Increased requirement of calcium to maintain calcium homeostasis with advancing age, continued decline in intestinal calcium absorption reported with ageing and apparent loss of intestinal adaptation to varying calcium intake of older women.
Studies have stated that low estrogen levels and women with

osteoporosis in postmenopausal have kidneys that did not reabsorb as much calcium as the women without osteoporosis [6-8]. However the serum calcium levels in all the three groups were within the normal range.

Conclusion

The prevalence of osteoporosis is very high in this part of India. Both natural and post- surgical menopausal women have lower levels of serum calcium. Our study suggests that postmenopausal women should take calcium rich foods like milk, cheese, broccoli, greens vegetables, soybean, spinach, tofu, enriched flour, sardine etc. If serum levels are low then supplementation with one gram calcium is advised.

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