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Original Research Article

Serum Calcium Levels in Pre-Menopausal and Post Menopausal Women

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Abstract:

Menopause is a phase from where bone mineralisation becomes critics because of various physiological and hormonal changes. Oestrogen deficiency and age related processes alter the rate of calcium turnover in bone that aging woman faces. Osteoporosis especially in postmenopausal women is a well-documented problem. In India lack of nutritional and health awareness makes its prevalence like tip of iceberg phenomenon. Changes in sex hormones during the menopause transition period have an impact on calcium homeostasis. This cross-sectional study was conducted in women of age 27–70 years. Serum calcium levels were estimated in Pre and Post Menopausal women. In postmenopausal women significant decrease in serum calcium level indicate remarkable risk towards negative calcium balance. They should be monitored for serum calcium levels, for reducing the risk of bone resorption.

Keywords : Calcium levels, Menopause.

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Introduction

Osteoporosis is a very important health problem worldwide. It is defined as a disease characterized by low bone mass and micro-architectural deterioration of bone tissue, leading to enhanced bone fragility and consequent increase in fracture risk [1]. Calcium ion is an essential structural component of the skeleton. Skeletal mineralization and rate of bone turnover are controlled by a number of hormones. In women the two major causes of bone resorption are oestrogen deficiency and age related processes. The process of bone loss starts at menopause which is 2-5% per year due to declining estrogens levels and is seen in the first 5-7 years after menopause. Later age-related bone loss occurs at a rate of 1% per year affects the cortical and trabecular bone. There is wide prevalence of vitamin D deficiency and low dietary calcium intake in Indian population, especially in postmenopausal women. Osteoporosis a serious potential problem that aging woman faces is asymptomatic unless any complication occurs. Postmenopausal osteoporosis is characterized by an imbalance between increased osteoclast activity and decreased osteoblast function due to estrogen deficiency resulting in increased bone remodeling, bone micro architectural deterioration, and skeletal fragility [2]. Extracellular calcium ion concentration is determined by the interaction of calcium absorption from the intestine, renal excretion of calcium, and bone uptake and release of calcium, each of these is regulated by parathyroid hormone, vitamin D and calcitonin amongst other hormones [3]. The estrogen deficiency in menopause results in increased boneturnover and indirectly may induce calcium loss by indirect effects on extra skeletal calcium homeostasis [4]. Calcium ion is an essential structural component of the skeleton. Skeletal mineralization and rate of bone turnover are controlled by a number of hormones. In women the two major causes of bone resorption are oestrogen deficiency and age related processes. The process of bone loss starts at menopause which is 2-5% per year due to declining estrogens levels and is seen in the first 5-7 years after menopause. Later age-related bone loss occurs at a rate of 1% per year affects the cortical and trabecular bone.[5,6] In female, at the age of 40–50 years, the monthly menstrual cycle becomes irregular, ovulation fails to occur during many cycles, and ultimately, there is cessation of the cycle which is called menopause. The female sex hormone diminishes to almost nil. In woman, the two major causes of bone loss are estrogens deficiency after menopause and age-related process.[7,8] The study was carried out to

evaluate calcium status in pre and post menopausal women.

Material and Methods

This cross-sectional study was conducted in women of age 27–70 years. Data source subjects were selected from the Outpatient Department of College Hospital. Women having hypertension, diabetes mellitus, history of hormones replacement therapy, and fracture were excluded from the study.

Inclusion criteria: Post menopausal women between age 50-75 years.

Exclusion criteria : 1) Surgical menopause due to hysterectomy

2) Post menopausal women on estrogen therapy

3) Women having Diabetes / Hypertension.

Informed consent from each subject was taken. 3–5 ml of venous blood was drawn aseptically from ante cubital vein of each subject. The blood sample was collected clean plain labeled tube and transferred to laboratory for the estimation of calcium ion. Serum calcium was measured by colorimetry method.

Statistics : Student t test was applied to see the significance of difference of parameters between 2 groups .Mean and standard deviation of variables was determined Correlation was done by using Pearson s correlation coefficient. The interpretation of P value are as follow p>0.05-not significant, p <0.01-significant, p <0.001- highly significant.

Results

Table 1: Shows serum calcium levels in Premenopausal and postmenopausal women.

	Premenopausal women n=50 Mean±SD	Postmenopausal women. n=50 Mean±SD	P value
Age (years)	27.64±3.8	58.62±6.8	<0.001
Serum Calcium levels (mg/dl)	10.54±1.82	8.73±1.14	<0.001

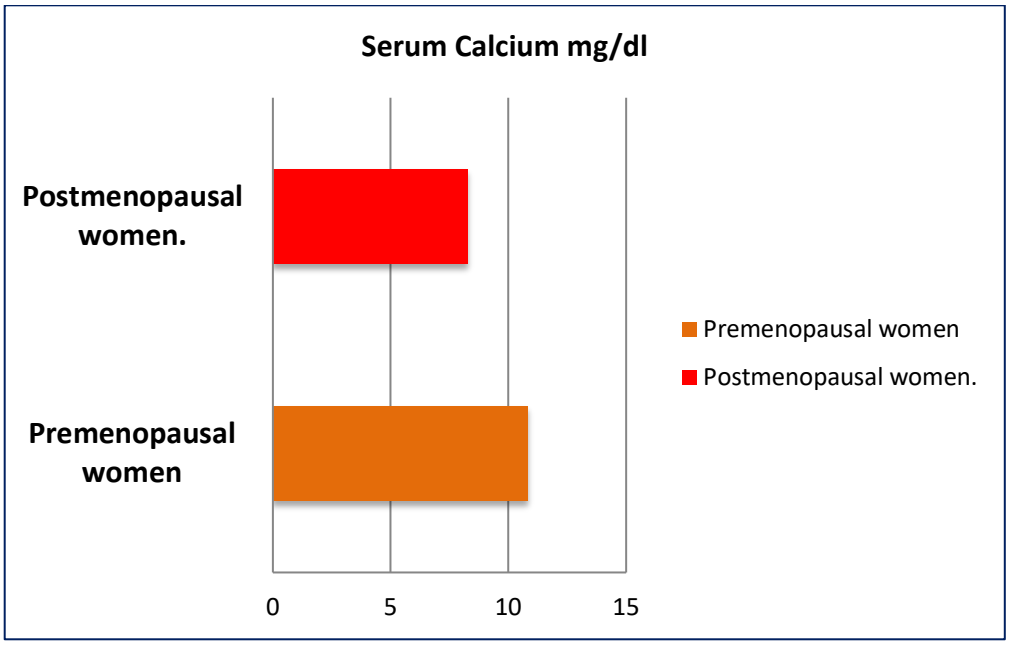

Figure 1: Serum calcium levels.

The table shows that age of pre-menopausal women was 27.64± 3.8 years (Mean± SD). Age of post-menopausal women was 58.62±6.8 years (Mean±SD). Serum calcium levels in post-menopausal women were less as compared to premenopausal women and this difference was highly significant p<0.001. Figure 1shows mean serum calcium levels in pre and post-menopausal women. It is observed that serum calcium levels are low in post-menopausal as compared to pre-menopausal women.

Discussion

Calcium status was evaluated in premenopausal and postmenopausal women in the present study. Postmenopausal women had significantly lower serum calcium levels than in premenopausal women. Declining

ovarian function before menopause is accompanied by the reduction in bone mass and altered calcium metabolism.[9] Estrogen deficiency may induce calcium loss due to decreased intestinal calcium absorption and decreased renal calcium conservation.[10] Calcium status was evaluated in premenopausal and postmenopausal women in the

present study. Postmenopausal women had significantly lower serum calcium levels than in premenopausal women. Declining ovarian function before menopause is accompanied by the reduction in bone mass and altered calcium metabolism. Estrogen deficiency may induce calcium loss due to decreased intestinal calcium absorption and decreased renal calcium conservation.[9] Besides osteoporosis, studies have shown that low dietary calcium intake may be associated with hypertension that can be corrected with calcium supplementation. The majority of women (70%) in our study as well as other study conducted in India had poor intake of calcium in their diet and are, therefore, at risk for these conditions. Although calcium supplementation in elderly postmenopausal women has proven benefits for bone density, there is no national program for supplementation of calcium for promotion of bone health. Declining ovarian function during menopause is accompanied by decrease in bone mass and altered calcium metabolism. Estrogens affect bone re-modelling by stimulating osteoblast, decreasing number and activity of osteoclast and synthesizing cytokine affecting bone resorption. In postmenopausal women, the mechanism by which ovarian hormones modulate negative calcium balance is not fully understood however oestrogen deficiency may induce calcium loss due to decreased intestinal calcium absorption and decreased renal calcium conservation, with a possible rise in gut calcium excretion.[10] Estrogen deficiency induces calciuria by increasing the filtered load of Ca2+. Estrogen receptors have been demonstrated on renal tubules[11,12] and it may directly act on kidney to promote renal calcium conservation. Estrogen also had shown effect on parathyroid gland receptors to enhance PTH secretions and indirectly acting for renal calcium conservation. Other factors reported to influence calcium homeostasis in menopause include increased urinary excretion of calcium, which is both menopause and age related. This occurs in the proximal tubule and can be corrected with oestrogen replacement.[13-15] A decrease in intestinal absorption of calcium is also reported in menopause and declining levels of vitamin D is implicated. Though one study suggests that oestrogen has a direct effect on calcium absorption by reducing the level of 1, 25 (OH)2 D, another study showed that oestrogen may work by directly altering the intestinal responsiveness to 1, 25 (OH)2D. The reduction in intestinal calcium absorption was observed to be much higher in older postmenopausal subjects above 75 years [16,17]. They should be monitored for serum calcium levels, for reducing the risk of bone resorption. Though normal serum calcium does not rule out risk of accelerated bone loss or osteoporosis, however decreased serum calcium may significantly play a role in therapeutic and follow up management.[18,19] Along with serum calcium level, vitamin D status and Bone Mineral Density can be helpful to find susceptible postmenopausal women.

Conclusion

On the basis of the result of the present study, it is concluded that serum calcium level was significantly decreased in postmenopausal women than in premenopausal women. They should be monitored for serum calcium levels, for reducing the risk of bone resorption. Though normal serum calcium does not rule out risk of accelerated bone loss or osteoporosis, however decreased serum calcium may significantly play a role in therapeutic and follow up management.

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