

Study of Serum Calcium Level in Pre- and Postmenopausal Women of Jamshedpur, Jharkhand

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Abstract

Background: Today, one of the most rapidly emerging global health problems in the postmenopausal women is osteoporosis. In postmenopausal women, two major causes of bone loss are estrogen deficiency and age-related process. The objective of this study was to evaluate calcium status in premenopausal and postmenopausal women.

Materials and Methods: This cross-sectional study was carried out in 42 premenopausal and 58 postmenopausal women at the Department of Physiology, M G M Medical College, Jamshedpur. Serum calcium level of each subject was determined.

Results: Mean serum calcium was significantly decreased in postmenopausal women compared to premenopausal women.

Conclusion: Serum calcium level was significantly deficient in postmenopausal women than in premenopausal women.

Key words: Osteoporosis, Postmenopausal, Serum calcium

INTRODUCTION

Calcium ion is an essential structural component of the skeleton. There is growing evidence for the importance of nutrition in the maintenance of bones and joints health. Nutrition imbalance with endocrine abnormalities may be involved in osteoporosis.^[1] 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 which is regulated by parathyroid hormone and Vitamin D and calcitonin.^[2] Bone mineralization and rate of bone turnover are controlled by a number of hormones in the body. Parathyroid hormone causes bone resorption and helps to maintain blood calcium level. Estrogen exerts a major effect in women on bone remodeling by inhibiting interleukin-6 production that reduces bone resorption

and also controls the timing of osteoclast apoptosis. Estrogen deficiency, therefore, results in a longer life span of osteoclasts.^[3] 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.^[4] Calcium is obtained from the diet through dairy as well as from non-dairy sources. The bioavailability of calcium from dairy sources is much higher than non-dairy sources. Several studies have reported that Indian diet does not meet the recommended dietary allowance of 600 mg/day of calcium for adult women, which has been recommended by Indian council of medical research.^[5] Milk and milk product are expensive commoditize, and amount purchased by the lower socioeconomic classes are likely to be merger.^[6] Further, unequal distribution of milk and milk product between male and female is another factor for worsening the situation. The difference in calcium intake between sexes is high in lower socioeconomic classes. Indian diets are predominantly vegetarian, and the contribution of dairy products to the overall calcium intake is minimal in the lower socioeconomic classes. Phytate and oxalate

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in fiber rich Indian diet also retard the absorption of calcium.^[7,8]

Government supplementation program provides pregnant and lactating mother with 500 mg/day of calcium through a serving of 165 g of micronutrient of fortified food per day; however, there is no national program for supplementation of calcium for promotion of bone health.^[9]

Aim and Objective

This study was carried out to estimate calcium level in premenopausal and postmenopausal women to evaluate the need of calcium supplementations in the study population.

MATERIALS AND METHODS

This cross-sectional study was conducted in women of age 40–75 years at the Department of Physiology, M.G.M Medical College, Jamshedpur, after permission from ethical committee. The period of study was July 2017–July 2018. Data source subjects were selected from the Outpatient Department of M.G.M Medical College and Hospital, Jamshedpur. Women having hypertension, diabetes mellitus, history of hormones replacement therapy, and fracture were excluded from the study. Informed consent from each subject was taken. 3–5 ml of venous blood was drawn aseptically from antecubital 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 using calcium (Arsenazo III) reagent.

RESULTS

A total of 100 patients from obstetrics and gynaecology, medicine, and orthopaedic outpatient department were enrolled in the study. Of 100, 42 were premenopausal and 48 were postmenopausal women. Mean serum calcium was significantly decreased in postmenopausal compared to that premenopausal women. The graph also shows significant decrease in calcium level in postmenopausal as compared to premenopausal. Dietary intake of calcium was not good in 70% of the patient, because most of the patients are from low or middle socioeconomic group [Tables 1 and 2]. Comparison of serum calcium level in post and premenopausal women [Figure 1].

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

Table 1: Mean calcium level in patients based on age group

Age group (year)	Number of patient	Mean calcium level (mg/dL)
40–45	24	8.3
46–50	18	8.2
51–55	20	8.1
56–60	12	8.1
61–65	11	7.5
66–70	10	7.5
71–75	05	7.1

Table 2: Mean calcium level of both groups

Patient group	Number of patient	Mean calcium level	S.D
Premenopausal	42	8.2±5.7	6.40
postmenopausal	58	7.6±7.1	6.85

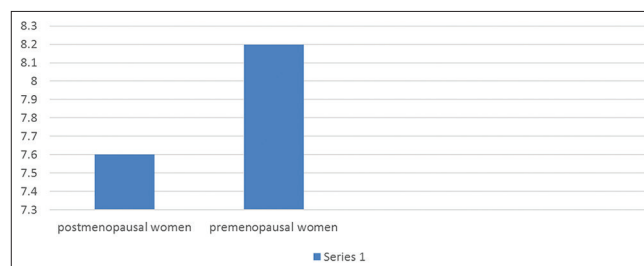


Figure 1: Serum calcium

ovarian function before menopause is accompanied by the reduction in bone mass and altered calcium metabolism.^[10] Estrogen deficiency may induce calcium loss due to decreased intestinal calcium absorption and decreased renal calcium conservation.^[11]

The intake of calcium ions among our study participant assesses using a questionnaire was low as determined by Indian council of medical research, for postmenopausal women, with 74.5% of women having low dietary intake of calcium ion, this was in accordance with similar studies done in Tamil Nadu and Andhra Pradesh among different population group.^[12]

Besides osteoporosis, studies have shown that low dietary calcium intake may be associated with hypertension that can be corrected with calcium supplementation.^[13,14] 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.

Multiple studies have shown that poor dietary calcium intake along with low physical activity is the two major

risk determinant for osteoporosis and fracture.^[15-17] In this study, 70% of postmenopausal women had both of these risk factors together. Health education on the importance of calcium intake in diet and knowledge on calcium-rich dietary sources would go a long way in improving the current scenario as those with poor knowledge, and low socioeconomic status was 4–5 time higher risk for consuming low calcium in their diet when compare to other.

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. It can be recommended that calcium supplementation can be given as a prophylaxis to prevent the long-term bone loss and to decrease the risk of fracture and osteoporosis in postmenopausal.

Women health education regarding calcium-rich diet must be given to postmenopausal women, especially those from low socioeconomic status. However, further studies are needed to evaluate the levels of calcium in postmenopausal.

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