

# A Clinical Study on Serum Calcium levels and Bone Mineral Density in Pre and Postmenopausal Indian Women

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## Research Article

**Abstract: Objective:** To study the correlation between serum Calcium and bone mineral density (BMD) in pre and postmenopausal women. **Material and methods:** The present study was a cross-sectional study. 40 women from each group i.e. premenopausal and postmenopausal women were selected for the study with no medical, surgical or gynecological abnormalities. The bone mineral density (BMD) was measured by Bone Densitometer and classified as normal, osteopenia and osteoporosis according to T-score. Serum calcium was measured on autoanalyser. **Results and Conclusion:** BMD scores were low in postmenopausal women according to T- score along with decreased Serum calcium level. There was significant association between BMD and serum calcium levels in postmenopausal women.

**Key words:** Postmenopausal Women, Serum calcium, Bone mineral density.

### Introduction

Today, one of the most rapidly emerging global health problems in the postmenopausal women is osteoporosis. Osteoporosis is a disease characterized by low bone mass and micro architectural deterioration of bone tissue, leading to enhanced bone fragility and a consequent increase in fracture risk. Osteoporosis is a silent disease, reflected only in a low bone density, till a fracture occurs. A low bone density (reflecting poor bone health) predisposes to osteoporotic fractures. With increasing longevity of the Indian population, it is now being realized that, osteoporotic fractures are a major cause of morbidity and mortality in the elderly. Based on 2001 census, approximately 163 million Indians are above the age of 50; this number is expected to increase to 230 million by 2015. Even conservative estimates suggest that of these, 20 per cent of women and about 10-15 per cent of men would be osteoporotic. The total affected population would, therefore, be around 25 million.<sup>1</sup> In order to effectively prevent and cure osteoporosis, the pathogenesis of osteoporosis must be explored. In this view, the present study is done to compare serum calcium levels and BMD in pre and postmenopausal women.

### Objective

1. To study the correlation between serum calcium and BMD in premenopausal and postmenopausal women.

### Material and Methods

The present study was a cross-sectional study conducted in Department of Physiology, Government Medical College, Latur. 40 premenopausal women with age between 35 to 45 years and 40 postmenopausal women between 50 to 65 years age group were selected from general population for the study. The study subjects with medical, surgical or gynecological abnormalities were excluded. The BMD was measured by Bone Densitometer and classified as normal, osteopenia and osteoporosis according to T-score given by WHO. Serum calcium was measured on autoanalyser.

### Results

**Table 1:** Distribution of Serum Calcium levels in Premenopausal and Postmenopausal Women

Sr. No.	Serum Calcium (mg/dl)	Premenopausal Women	Postmenopausal Women
1.	<8.5 (mg/dl)	09 (22.50%)	30 (75.00%)
2.	≥8.5 (mg/dl)	31 (77.50%)	10 (25.00%)
3.	Total	40 (100%)	40 (100%)

( $\chi^2 = 22.06$  df= 1;  $p < 0.001$  Significant)

**Table 2:** Comparison of Serum Calcium levels in Premenopausal and Postmenopausal Women

Sr. No.	Parameter	Premenopausal (n=40)	Postmenopausal (n=40)	p- value
1.	Serum calcium	09.05 ± 0.50	08.32 ± 0.43	<0.0001 *

(Values are expressed as Mean ± SD; \* p value < 0.0001 Significant)

**Table 3:** Distribution according to Bone Mineral Density (T-score) level in Premenopausal and Postmenopausal Women

Sr.No.	BMD (T-)	Premenopausal Women	Postmenopausal Women
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	Score)		
1.	>-1	07 (17.50%)	00 (00%)
2.	-1 to -2.5	27 (67.50%)	10 (25%)
3.	<-2.5	06 (15.00%)	30 (75%)
4.	Total	40 (100%)	40 (100%)

( $X^2 = 30.81$  df= 2;  $p < 0.001$  Significant)

**Table 4:** Comparison of BMD (T-Score) in Premenopausal and Postmenopausal Women

Sr.No	Parameter	Premenopausal (n=40)	Postmenopausal (n=40)	p-value
1.	BMD	-1.70 ± 0.84	-2.80 ± 0.42	<0.0001*

(Values are expressed as Mean ± SD; \* p value < 0.0001 Significant)

**Table 5:** Correlations of Serum Calcium with BMD in Premenopausal and Postmenopausal Women

Sr. No.	Correlation Between	Premenopausal (n=40)		Postmenopausal (n=40)	
		r-value	p-value	r-value	p-value
1.	Serum Calcium & BMD	0.07	0.64	0.36	0.02*

(r- Pearson's Correlation Co-efficient; \* p value < 0.05 Significant)

## Discussion

In the present study, forty premenopausal and forty postmenopausal women with age range of 35 to 45 years and 50 to 60 years respectively were included. The mean age was  $39.63 \pm 3.12$  and  $55.35 \pm 3.34$  in pre and postmenopausal women respectively. As per table no.1, among 40 postmenopausal women, 30 women had serum calcium levels  $< 8.5$ mg/dl and the association between them was highly significant ( $p < 0.001$ ). Postmenopausal women had significantly lower serum calcium as compared to premenopausal women ( $p < 0.0001$ ) as shown in table 2. Our result was comparable with that obtained by – Hamid Javaid Qureshi, G. Hussain *et al.*<sup>02</sup>, B.K. Jain, Smita S. Patne *et al.*<sup>03</sup>, Indumati.V, Vidya.S.Patil *et al.*<sup>04</sup> Calcium balance is critically important to maintain the bone mass and in prevention of bone loss. Calcium balance depends on various factors, including the amount of calcium in the diet, the efficacy of absorption by intestine and excretion of calcium. In the present study estrogen deficiency after menopause causes calcium loss by indirect effects on extra skeletal calcium homeostasis as well as decrease intestinal calcium absorption and decreased calcium conservation by kidney. It is also known that intestinal absorption of calcium decreases with age, this may be due to an age related decrease in serum levels of 1,25-dihydroxycholecalciferol. Malabsorption and deficiency of calcium due to hormonal imbalance may lead to disorders of bone mainly osteopenia and osteoporosis. The table no.3 shows that out of 40 postmenopausal women, 30 (75%) women had BMD (T-score)  $< -2.5$  and 10 (25%) women had T-score

between -1 to -2.5 which was indicative of osteoporosis and osteopenia respectively. BMD (T-score) was highly significantly ( $p < 0.0001$ ) decreased in postmenopausal women ( $-2.80 \pm 0.42$ ) than in premenopausal women ( $-1.70 \pm 0.84$ ) as shown in table 4. There was a significant positive correlation between serum calcium and BMD in postmenopausal women but not in premenopausal women as described in table 5. Similar result was obtained by following authors in their respective studies– Jyothi Unni, Ritu Garg *et al.*<sup>05</sup>, Seema Sharma and Sunila Khandelwal<sup>06</sup> Bone Mineral Density (BMD) is a measure of calcium and other minerals in the bone giving it strength. Bone undergoes remodeling constantly replacing the old bone content with new content. Bone remodeling is dependent on (1) mechanical stresses, (2) hormones like parathyroid hormone, calcitonin, vitamin D, growth hormone and estrogen and (3) locally produced cytokines, prostaglandins and growth factors. The decrease in these factors in old age mainly leads to osteoporosis.

## Conclusion

This study suggests that there was positive association between serum calcium and BMD. The decreased concentration of calcium and BMD scores in postmenopausal women indicates that they are more prone to fractures and osteoporosis. This study did not reveal other accepted risk factors for osteoporosis like exercise, lactation, calcium intake etc. It is recommended that adolescent should consume a diet rich in calcium and with sun light exposure for vitamin D absorption. Osteoporosis is associated with high morbidity and mortality, so preventive measures can be instituted with early diagnosis.

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