



Correlation between bone mineral density and serum calcium level in urban clinic

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ABSTRACT

An attempt was made to study the correlation between bone mineral density (BMD) with Serum Calcium in persons attending Urban Clinic. The present study was conducted in our Urban clinic those attending were 84 (25 males and 59 postmenopausal females) with age group between 50 to 65 years. Body Mass Index (BMI) was calculated in each individual. 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. BMD scores were low in postmenopausal women and men above 56+ years age according to T-score along with decreased Serum calcium level. There was significant association between BMD and serum calcium levels.

INTRODUCTION

Bone turnover increases to high levels and estrogen deficiency may induce calcium loss by indirect effects on extra skeletal calcium homeostasis. In elderly males there is gradual decrease in androgenic hormones. The deficiency of estrogen in female and androgen in males, leads to bone mineral loss. Menopause is defined as, the time of cessation of ovarian function resulting in permanent amenorrhea [1] in postmenopausal women, the two major causes of bone loss are estrogen deficiency after menopause and age related processes [2]. Calcium ion is an essential structural component of the skeleton. BMD is a good indicator for measuring bone tissue loss in the body and concomitant Calcium level is lowered leading to lowering of serum ionic Calcium measurements [3]. In this view the objective of present study is an attempt to investigate association between serum calcium, BMD in post menopausal women and elderly males, dwellers of Urban area, those attending at Urban clinics BMD camp.

MATERIAL AND METHODS

The present study was conducted jointly in association with Department of Orthopedics and Preventive and Social Medicine, at Career Institute of Medical Sciences & Hospital, Lucknow between August 2013 to July, 2014; at Urban clinic camps. Total 84 (25 elderly males and 59 post menopausal females) were included in the study from general population who attended BMD

camp at Urban clinic. Inclusion criteria: randomly persons were included and any associated Diabetes, Hypertension, Gynecological disorder (post menopause due to early Salpingo-oophorectomy) were also noted. Exclusion criteria: However, patients with Auto immune and other metabolic abnormalities or arthropathies were excluded. Formal permission was obtained from our Ethical committee. 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 auto analyser.

RESULTS

The results of various parameters in postmenopausal women and elderly males is shown in following tables as below:

From table no.1 it has been observed that, among 59 postmenopausal women 38 (64%) women shows T-score = -2.5 which was a sign of osteoporosis, while 21 (36%) had severe osteoporosis (T score >2.5) and max osteoporosis was observed 53 (63%) in age group more than 60 years. The association between postmenopausal age and BMD was significant. ($p < 0.05$).

The distribution of serum calcium according to age and sex is described in table no.2 and it shows that around 52 (62%) women have low serum of serum calcium was 8.34 ± 0.47 . Biochemical serum calcium was statistically significant. ($2 = 17.06$, $p <$

Table 1 : Bone Mineral density Distribution according to Age and BMD

Age (years)	Bone Mineral Density (T-score)				Total
	>-2.5		=-2.5		
	M	F	M	F	Total
50-55	01	02	01	03	07 (8%)
56-60	02	07	04	11	24 (29%)
61-65+	07	12	10	24	53 (63%)
Total	10	21	15	38	84(100%)
T score	31(37%)		53(63%)		84

Table 2 : Distribution of Serum Calcium according to age and Sex

Age (years)	Serum Calcium (mg/dl)				Total
	< 8.5		=8.5		
	M	F	M	F	Total
50-55	02	03	05	03	13 (15%)
56-60	05	15	07	05	30 (36%)
61-65+	5	19	08	02	41 (49%)
Total	49(58%)		35(42%)		84(100%)

Table 3 : Distribution according to BMD and Serum Calcium

Serum Calcium (mg/dl)	Bone Mineral Density (T-score)		Total
	=-2.5	>-2.5	
< 8.5	37 (44%)	14 (16.6%)	51 (60.71%)
=8.5	23 (27%)	10 (11.9%)	33 (39.29%)
Total	60(71.41%)	24(28.5%)	84(100%)

0.0001). Serum calcium was less than 8.5 mg/dl) in 49(58%) together males plus females and among those age group more than 56 years age specially in females. The association between post menopausal age and serum calcium levels was highly significant. ($p < 0.0001$)

The distribution of serum calcium and BMD among postmenopausal women and elderly males is shown in table no.3. Around 51 (60.71%) patients shows serum calcium levels <8.5mg/dl with BMD = -2.5 in 44% subjects while only 14(16.6%) showed BMD T score >-2.5, whereas 33(39.2%) subjects had T score \geq -2.5. The association between serum calcium and BMD was highly significant. ($\chi^2 = 24.43$ (Yates' corrected) $df = 1$ $p < 0.0000$ significant).

DISCUSSION

The present cross-sectional study was carried out in Postmenopausal women and elderly males. This study was conducted to give an idea about the rates of bone formation (serum calcium) and resorption. BMD is a measure of calcium and other minerals in the bone giving it strength. High rate of bone turnover correlates with low bone mass. Estrogen deficiency at menopause increases the rate of bone remodeling which results in high turnover bone loss.[6] Calcium ion is an essential structural component of the skeleton. Estrogens deficiency after menopause induces calcium loss by indirect effects on extra skeletal calcium homeostasis as well as decrease intestinal calcium absorption. In elderly males drop in androgens will have similar effect over bone metabolism. Deficiency of calcium and malabsorption due to hormonal imbalance may lead to disorders of bone mainly osteopenia and osteoporosis.[4,5] The results also stated that BMD in post

menopausal women and elderly males decrease in proportion to decrease of serum calcium and difference between them was statistically highly significant. Estrogen in female and Androgen in male influences all aspects of bone physiology throughout life. The hormone maintains bone mass in adult women partly by slowing the bone remodeling and partly by maintaining a balance between osteoblasts and osteoclasts. When estrogen is deficient, there is an increase in the activation of new bone remodeling units. Both formation and resorption are altered with the result that resorption exceeds formation, producing a negative balance resulting in postmenopausal bone loss. Once the bone mass falls below a critical threshold level, person is diagnosed to have osteoporosis when the bone density falls. Normal BMD scores are: T score of 1 or > is normal. T score -1.0 and -2.5 is 'low bone mass' or osteopenia. T score -2.5 or below is osteoporosis. Thus while BMD provides a static picture of the skeleton. The Serum Calcium level, biochemical markers of bone turnover provide dynamic measures of bone remodeling and thus potentially useful in predicting the course of changes in bone mass.[7]

CONCLUSION

The decreased concentration of calcium and higher BMD scores in postmenopausal women indicates that they are more prone to fractures and osteoporosis. Elderly males above 60 years age with Low Calcium are also more prone for osteoporosis and risk of fracture. Present evaluation suggests that there was positive association between low serum calcium and lower T-score of BMD. However, present comparative study gives an insight for evaluation in large sample and also correlation of level of calcium with BMD in rural versus urban subjects.

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