

Prevalence of osteoporosis in post-menopausal women and their risk factors in Indian prospects

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Abstract:

Objective: To assess the prevalence of osteoporosis in ambulatory post-menopausal Indian women as measured by Calcaneal Quantitative ultrasound (QUS) and to study dietary calcium intake and vitamin D status and their influence on bone mineral density (BMD).

Methods: This was a six month descriptive observational study comprising 180 menopausal ambulant subjects performed at M.G.M Medical College Hospital, Jamshedpur, Jharkhand, India, from July 2017 to December 2017 who completed semi structured questionnaire with subsequent measurement of QUS of the right calcaneum.

Result: The prevalence of osteoporosis was found 48.5% in post -menopausal women. There was significant correlation between low dietary intake of calcium and vitamin D, body mass index, early menopause, parity, occupation, education, socio-economic condition and addictions.

Conclusion: The high prevalence of osteoporosis and vitamin D insufficiency in post-menopausal women in India is a major health concern. It is therefore necessary to create awareness among postmenopausal population of India to take adequate calcium and vitamin D supplement to avoid future fracture.

Key words: BMD, Osteoporosis, post-menopausal, QUS

Date of Submission: 22-04-2018

Date of acceptance: 08-05-2018

I. Introduction

Osteoporosis is the most common metabolic bone disease characterized by low bone mass and micro architectural deteriorations of bone tissue leading to enhanced bone fragility and a consequent increase in fracture risk¹⁻². Fractures especially of the spine, hip and wrist are a frequent clinical complication of osteoporosis. Osteoporosis related fractures associated with substantial pain, suffering, disability, and possibly even death for the affected patients. Increasing longevity and a greater proportion of the Indian population is older than 50 years are likely to result in increased number of people affected by osteoporosis. The prevalence of osteoporosis among women in India by small studies suggest that 230 million Indians expected to be over the age of 50 years, and 20% are osteoporotic. Prevalence of osteoporosis is found 8% to 62% in Indian women of different age groups has been reported by several studies³.

Vitamin D has a major role in bone metabolism.⁴ Exposure to sunlight and dietary intake of vitamin D are the two major sources of it. Dietary intake of calcium is also important for bone mineralization and bone strength. The process of aging is associated with decrease calcium absorption from the gut especially in post-menopausal women. Thus there is an increase requirement of calcium. After menopause, due to lack of estrogens the rate of bone turnover increases resulting in accelerated bone loss. This silently progressing metabolic bone disease is widely prevalent in India and osteoporotic fractures are a common cause of morbidity and mortality in postmenopausal women.⁵

The strength of a bone is determined by its mineral density and microarchitecture. These two factors are important determinants of fracture risk in osteoporosis. Bone mineral density (BMD) is the basis for classifying osteoporosis according to the World Health Organization. Dual Energy X-ray Absorptiometry (DEXA) is gold standard to Bone Mineral Density (BMD), however Calcaneal quantitative ultrasound (QUS) is another simple low cost, instrument use to screen osteoporotic subjects⁶.

The aim of the present study to know the prevalence of osteoporosis in postmenopausal women coming to MGM Medical College Hospital, Jamshedpur and its risk factors.

II. Material and method

This is observational descriptive study carried out in Orthopaedics and Gynaecology Department OPD of MGM Medical College , Hospital, Jamshedpur from July 2017 to December 2017. Women who were 50 years old or more, ambulatory and menopausal for at least 1 year were eligible for inclusion in this study. All participants completed a structured questionnaire. Information on demographic profile, age, age of menarche, age of menopause, nutritional history, complains, parity, education and socio-economic status was taken.

Postmenopausal women younger than 50 years and non-ambulatory were excluded from this study. Dual Energy Absorptiometry (DEXA) is the Gold Standard for bone mineral density; however Quantitative Ultrasound Attenuation (QUS) is cost effective and reliable alternative. The ultrasound machine used Broadband Ultrasound Attenuation (BUA) and speed of sound (SOS) to calculate BMD. BMD values calculated by ultrasound machine were converted into T-scores. According to World Health Organisation (WHO), T-score <-1 was considered normal; -1 to -2.5 was considered osteopenia; and T-score of -2.5 or above was taken as osteoporosis.

III. Observation & Result

A total of 180 participants were included in the study. Their anthropometric data, various factors affecting BMD and biochemical results were summarized in Table -1, 2 & 3. Of these study subjects, 105 (58%) were 60 years old or older. Overall 18 (10%) were obese (BMI >30 kg/m²). None of the subject had a dietary Calcium intake that exceeded the recommended daily allowance of >1000 mg daily. The BMD study shows osteopenia in 102 (57%) and osteoporosis in 60 (33%) while normal in 18 (10%). More than >60 yrs had high prevalence of osteoporosis than age group <60 yrs. Bone status of Indian women from a low income group, we found high prevalence of osteopenia in 94 (52%) and osteoporosis in 52 (29%). Women with low BMI <25 were associated with osteopenia in 62% in comparison to osteoporosis in 25.8% women. Women with high parity (>3) had higher occurrence of osteopenia. The vitamin D status shows 20% had sufficiency (>20 ng/ml), 70% were found to have vitamin D insufficiency.

Table-1: Results of BMD

BMD (T SCORE)	N(%)
Normal (<-1)	18(10%)
Osteopenia (-1 to -2.5)	102(57%)
Osteoporosis (> -2.5)	60(33%)

Table-2: Distribution of body weights of the participants

Weight/BMI	%
Underweight (BMI is <18.5)	8%
Normal weight (BMI is 18.5 to 24.9)	54%
Overweight (BMI is 25 -29.9)	22%
Obese (BMI is 30 or more)	10%

The average body mass index was 23.8 (range 16-35), 60% patients were of normal weight range.

Table 3: Anthropometric Data, Factors Affecting BMD and Results of Biochemical Tests in the Study Cohort.

Characteristics	BMD (Bone Mineral Density)		
	Normal (%)	Osteopenia (%)	Osteoporosis (%)
Age			
50-60 (75)	14 (18.6%)	33 (43%)	28 (38.6%)
61-80 (105)	4 (3.7%)	71 (67%)	30 (33.5%)
Parity			
0 (20)	4 (20%)	11 (55%)	5 (25%)
1-3 (106)	25 (24%)	66 (62%)	15 (14%)
>3 (54)	8 (15%)	40 (74%)	6 (11%)
Socioeconomic condition			
High (10)	2 (20%)	6 (60%)	2 (20%)
Middle (65)	18 (28%)	39 (60%)	8 (12%)
Low (105)	13 (12%)	67 (64%)	20 (19%)
Rural/Urban			
Rural (64)	15 (24%)	42 (65%)	7 (11%)
Urban (116)	30 (27%)	71 (61%)	14 (12%)
BMI			
<25 (108)	12 (10%)	82 (76%)	16 (15%)
>25 (72)	18 (25%)	36 (50%)	8 (11%)

Women with high parity (>3) had higher occurrence of osteopenia .

IV. Discussion

Osteopenia and osteoporosis are characterised by decreased bone mineralization. Diagnosis of osteoporosis rests on the measurement of BMD by ultrasound of right heel. BMD values are converted into Tscore by comparing them with values of normal adult population.

Our study found that more postmenopausal females had osteoporosis. Similarly, older postmenopausal women had higher prevalence of osteoporosis than the younger age group. It found that 34% of postmenopausal women had osteoporosis, while most of them were postmenopausal women >60 yrs.⁷ It shows that duration of menopause has direct impact on developing osteoporosis. There are many reasons for higher prevalence of osteoporosis in female low bone mass, child bearing, low dietary calcium are the main factors and after menopause bone mass in women declines rapidly because of decreased level of oestrogens.⁸

The vitamin D status in present study subjects shows that 20% had vitamin D sufficiency and 80% had insufficiency or deficiency. Measurement of 25OHD is the most reliable method of assessing vitamin D status. It reflects the sum total of vitamin D absorbed from intestine and vitamin D synthesized by the skin. It has been clearly demonstrated that cutaneous vitamin D synthesis decreases with advancing age. MacLaughlin and Holick showed a decline of about 50% in skin concentration of 7-dehydrocholesterol from age 20 to age 80 yrs.⁹ Calcium and Vitamin D is required for normal bone growth and mineralization. Decreased calcium intake leads to demineralization and mobilization of calcium from bone mass and results in osteoporosis.

Old persons are particularly prone to decreased calcium intake and absorption. In postmenopausal women, lack of oestrogen leads to decrease in calcium absorption from intestine and promote calcium re-absorption from kidney. Moreover oestrogen promotes mineralization of bone. This is one and important reason of rapid decrease in bone mass in female after menopause. Administration of Calcium with oestrogens after menopause results in greater degree of recovery in bone mass than the administration of Calcium alone.

An increase in body mass index had a significant impact on BMD. It has been attributed to the higher level of circulating endogenous oestrogen from adipose tissue and muscle and the higher gravitational load in femur neck and lumbar spine. The number of years since menopause had a significant effect on BMD in the current study, consistent with findings in previous reports. Parity correlated negatively with BMD in the current study. It is possible that low dietary calcium intake during pregnancy and lactation may be responsible for our findings.

V. Conclusion

The present study shows the prevalence of osteoporosis in postmenopausal women to be about 34% and the prevalence of vitamin D insufficiency or deficiency to be 70%. Simple interventions such as calcium intake and vitamin D supplements combined with oestrogen therapy with mass education may significantly reduce morbidity and mortality associated with osteoporotic fracture in the population.

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YakubSanga "Prevalence of osteoporosis in postmenopausal women and their risk factors in Indian prospects" IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), vol. 17, no. 5, 2018, pp 44-46.