

# Prevalence of Osteoporosis in Younger Population - An Indian Perspective

D'Almeida V. R.<sup>1\*</sup>, Shetty M. B.<sup>1</sup>, Adiga K. R.<sup>2</sup>, Latheesh L.<sup>1</sup>, Nazareth E. L.<sup>2</sup>

<sup>1</sup>Assistant Professor, <sup>2</sup>Professor, Department of Orthopaedics, Fr. Muller Medical College, Mangalore, Karnataka, INDIA.

\*Corresponding Address:

[v.dal1981@gmail.com](mailto:v.dal1981@gmail.com)

## Research Article

**Abstract: Objective:** Osteoporosis and osteoporotic fractures are widely prevalent in Indian subcontinent. Awareness of osteoporosis has grown worldwide in recent years as a major health problem having significant implications in day to day life. It is a common cause of morbidity and mortality in elderly people. Rapid bone loss occurring in postmenopausal women due to hormonal factors is a known fact. But there is a worrying trend of increasing prevalence of osteoporosis among the younger women in India. The occurrence of this disease among the male population also has been under studied. **Materials and Methods:** This cross-sectional study covered the 405 patients who attended a bone mineral density camp that was conducted in a tertiary care hospital. The bone density of these people was measured using a quantitative ultrasound (QUS) machine standardized to the Indian population. The significance of the results was calculated using the chi-square test. **Results:** Sixty people of the total hundred and five with age less than thirty years had decreased bone density ( $p < 0.001$ ). The male population having decreased bone mass was also more than expected. **Conclusions:** Hence this study indicates that osteoporosis and osteopenia are prevalent in younger population too contrary to the popular belief. If detected earlier it can be treated and the morbidity caused by it can be avoided.

## Introduction

Osteoporosis is a skeletal disorder characterized by impaired bone strength that increases the risk of fracture. Bone strength is a composite of bone density and bone quality. The latter is not fully understood but includes aspects of bone architecture, damage accumulation (e.g., microfractures), and mineralization.<sup>1</sup> Bone metabolism is a dynamic and continuous process that maintains a balance between the resorption of old and injured bone initiated by osteoclasts and the formation of new bone by osteoblasts.<sup>2</sup> About 40% of the peak bone mass is accumulated during adolescence which protects against post-menopausal osteoporosis.<sup>3</sup> Following menopause the protective effects of the female hormones are withdrawn and hence there is an increase in the bone resorption causing osteoporosis. Osteoporosis is a major health and economic problem. Osteoporosis related costs approached \$17 billion in 2005 in a study conducted in the United States of America.<sup>4</sup> although medical intervention can reduce the risk of an osteoporotic fracture and is cost effective; it is often under diagnosed and untreated. Currently, dual energy X-ray absorptiometry

(DXA) is the gold standard diagnostic tool for BMD measurement.<sup>5</sup> Other Available screening methods includes calcaneal quantitative ultrasonography (QUS), and clinical risk assessment instruments for low bone mineral density (BMD) or fracture.<sup>6</sup> However, DXA testing typically requires going to a referral centre and is relatively expensive. In contrast, QUS and risk assessment instruments are portable and less expensive.<sup>7,8</sup> There have been a few studies demonstrating the prevalence of osteoporosis in diseased young people eg chronic obstructive lung disease.<sup>9</sup> There aren't many studies that have been published regarding the prevalence of this disease in the apparently healthy younger population. From an Indian perspective there is not much research material on the prevalence of osteopenia among the youngsters.

## Materials and Methods

We performed a cross sectional study of 405 people attending the bone mineral density camp conducted in our hospital. One hundred and seventy one of them were males and 234 were females. They were categorized into two groups based on their age-one below 30 years of age and the other 30 years and above. The BMD of their right calcaneus was measured using a QUS machine which was standardized to a normal Indian population. Based on the T score and the Z score they were categorized into people with normal bone mineral density and those with decreased bone mineral density. The data obtained was analyzed, and the differences in the mean of various parameters were compared using student's t-test and the chi-square test.

## Results

Of the total 405 people who were considered for the study, 209 people had decreased bone mineral density. Of these 60 people were below the age of 30 years (Table 1). 46% of the people over 30 years of age had decreased bone mineral density. The proportion of people with decreased BMD is high (57.14% in those less than 30 years, 49.66% in those more than 30 years). The fact that there is no significant difference ( $p > 0.05$ ) between the

two age groups is contrary to the belief that osteoporosis and osteopenia is mainly a disease of the old age. Of the sixty who had decreased BMD, 54 were osteopenic and 6 were osteoporotic. Of the 149 above the age of 30 years, 90 were osteopenic while 59 were osteoporotic. The second observation made was that 34 of the total 171 males suffered with decreased bone mineral density, whereas 175 of the total 234 females had decreased bone mineral density which was significant ( $p < 0.001$ ) (Table 2). Of the 34 males with decrease bone mineral density – 30 were osteopenic and 4 were osteoporotic and of the 175 females, who had decreased bone mineral density, 114 were osteopenic and 61 were osteoporotic.

## Discussion

Osteoporosis is a metabolic bone disease characterized by low bone mass and the deterioration of bone microarchitecture.<sup>1</sup> It is a major disease which has significant implications on public health and the economic growth of a nation. It is a silent disease that may go undetected till the harmful consequences like fragility fractures, bone pains, spine fractures present themselves. There are several screening tests for this condition which are cost effective. Usage of the screening tests in the right manner could help an early detection of this condition and appropriate treatment. Expert groups from the Indian sub continent have estimated that the number of osteoporosis patients will increase to 36 million in 10 years from approximately 26 million in 2003.<sup>11</sup> While osteoporosis is a well-recognized public health problem associated with increased morbidity, mortality, and health care cost amongst elderly, there is scarcity of epidemiological data on the magnitude of the problem in India.<sup>11</sup> In an earlier study conducted on postmenopausal women with age over 60 years from the northern part of India, prevalence of osteoporosis was 62%.<sup>12</sup> It is projected that more than about 50% of all osteoporotic hip fractures in the world will occur in Asia by the year 2050.<sup>13</sup> According to the World Health Organization's health statistics for 2011, in India the average female life expectancy in 2011 is 68 years and is projected to increase to 73 years by 2021. There will be a large number of women who spend a substantial part of their life even after menopause. Studies have shown that majority of the bone mass is accumulated during the growth period.<sup>2</sup> There are several factors like genetic influence, dietary habits, emotional factors, socio economic status which do play an important role in the development of the musculoskeletal system. Youngsters who have a decrease bone quality tend to develop osteopenia which make them prone for fragility fractures of the spine, around the wrist and hip. Bone mineral density (BMD) is widely recognized as one of the main factors predictive of fragility fractures.<sup>14,15,16</sup> Use

of clinical risk factors and BMD has been shown to enhance prediction of osteoporotic fractures.<sup>17</sup> DEXA scan is the gold standard for measuring the BMD. But it is an expensive tool and not universally available. Studies have shown that the QUS can measure the BMD with reasonable accuracy. It is cost effective as well with no risk of exposure to radiation.<sup>7,8,10</sup> Hence in our study we used the QUS of the right calcaneum to assess the bone quality of a cross section of people. Four hundred and five apparently normal people with no pre-morbid conditions were considered for this study. Their gender and age were noted. The QUS machine standardized to the Indian population was used. In our study although the proportion of people suffering from decreased bone mineral density was high (57.14% in those less than 30 years, 49.66% in those more than 30 years) there was no significant difference between the two age groups ( $p > 0.05$ ). This indicates that people at a younger age are as prone as the elderly for osteopenia. There was also a significant association between gender and bone mineral density. Our study showed that females are more prone for osteopenia or osteoporosis. ( $p < 0.05$ ). These results showed a disturbing trend of osteopenia among younger women. There isn't sufficient literature material regarding the prevalence of osteopenia and osteoporosis among young people. Hence our study intended to use the QUS as a screening test to identify the people belonging to the risk group so that they could be treated as indicated. QUS can be used as a cost effective measure as it is easily available, portable and inexpensive. The limitations of this study were that people belonging to the same ethnic group were taken while India is a land of diversity. The food habits and the genetic input vary from place to place which was not taken into consideration.

## Conclusion

Current methods of bone densitometry are powerful tools for assessing the risk of fracture and identifying patients who will benefit most from the treatments that have been shown to reduce fracture risk in patients with osteoporosis. Selective use of densitometry with simple devices like the QUS is a valuable part of primary care for not only the postmenopausal women but also the younger population.

## Tables:

**Table 1:** Age and bone mineral density

Age(years)	Decreased BMD	Normal BMD	Total
<30	60	45	105
>30	149	151	300
	209	196	405

$\chi^2 = 1.74, p = > 0.05, df = 2$ , Not significant

**Table 2:** Gender and bone mineral density

Gender	Decreased BMD	Normal BMD	Total
Males	34	137	171
Females	179	59	234
	209	196	405

$\chi^2 = 119.25$ ,  $p < 0.001$ ,  $df = 2$ , Significant

## References

1. NIH Consensus Panel on Osteoporosis Prevention, Diagnosis, and Therapy. Osteoporosis prevention, diagnosis, and therapy. *JAMA*. 2001; 285:785-795.
2. Simsek B, Karacaer O, Karaca I. Urine products of bone breakdown as markers of bone resorption and clinical usefulness of urinary hydroxyproline: an overview. *Chin Med J* 2004; 117(2): 291-295.
3. Malkovic V, Jelic T, Wardlaw GM, Ilich JZ, Goel PK, Wright JK et al. Timing of peak bone mass in Caucasian females its implication for the prevention of osteoporosis. *J Clin Invest* 1994; 93:799-808.
4. Burge R, Dawson-Hughes B, Solomon DH, Wong JB, King A, Tosteson A. Incidence and economic burden of osteoporosis-related fractures in the United States, 2005-2025. *J Bone Miner Res*. 2007; 22:465-475.
5. Kanis JA. Diagnosis of osteoporosis and assessment of fracture risk. *Lancet* 2002; 359:1929-1936.
6. Nelson HD, Helfand M, Woolf SH, Allan JD. Screening for postmenopausal osteoporosis: a review of the evidence for the U.S. Preventive Services Task Force. *Ann Intern Med*. 2002; 137:529-541.
7. Ahuja SP, Greenspan SL, Lin Y, Bowen A, Bartels D, Goyal RK. A pilot study of heel ultrasound to screen for low bone mass in children with leukemia. *J. Pediatr Hematol Oncol*. 2006; 28:427-432.
8. Bauer DC, Ewing SK, Cauley JA, et al. Quantitative ultrasound predictship and non-spine fracture in men: the Mr OS study. *Osteoporos Int*. 2007; 18:771 -777.
9. Osteoporosis in chronic obstructive pulmonary disease patients. Jørgensen, Niklas Rye; Schwarz, Peter. *Current opinion in pulmonary medicine*. Issue: Volume 14(2), March 2008, p 122-127.
10. Díez-Pérez A, Marín F, Vila J, et al. Evaluation of calcaneal quantitative ultrasound in a primary care setting as a screening tool for osteoporosis in postmenopausal women. *J Clin Densitom*. 2003; 6:237-245.
11. Osteoporosis Society of India (2003) Action plan osteoporosis: consensus statement of an expert group. New Delhi.
12. Chibber G, Roy R, Eunice M, Srivastava M, Ammini AC (2007) Prevalence of osteoporosis among elderly women living in Delhi and rural Haryana. *IJEM* 1(1&2):11-14.
13. Johnell O, Kanis JA (2006) An estimate of the worldwide prevalence and disability associated with osteoporotic fractures. *Osteoporos Int* 17:1726.
14. Johnell O, Kanis JA, Oden A, et al. Predictive value of BMD for hip and other fractures. *J Bone Miner Res* 2005; 20:1185 - 1194.
15. Marshall D, Johnell O, Wedel H. Meta-analysis of how well measures of bone mineral density predict occurrence of osteoporotic fractures. *BMJ* 1996; 312:1254 - 1259.
16. Miller PD, Siris ES, Barrett-Connor E, et al. Prediction of fracture risk in postmenopausal white women with peripheral bone densitometry: evidence from the National Osteoporosis Risk Assessment. *J Bone Miner Res* 2002; 12:2222 -2230.
17. Bow CH, Tsang SW, Loong CH, Soong CS, Yeung SC, Kung AW. Bone mineral density enhances use of clinical risk factors in predicting ten-year risk of osteoporotic fractures in Chinese men: the Hong Kong Osteoporosis Study. *Osteoporos Int* 2011.