

Prevalence and risk factors of osteopenia and osteoporosis in Indian women

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Abstract :

Background: Osteoporosis is a major disease which has significant implications on public health. Osteoporosis is three times more common in women as compared to men. The main purpose of our study was to determine the prevalence of osteopenia and osteoporosis in females in 19 to 65years of age group.

Methodology: This was a prospective cross sectional study carried out in the OPD of a private medical college. Healthy relatives of patients attending the Orthopaedics OPD were selected. BMD was tested using calcaneal quantitative ultrasound.

Results: Out of 1206 women, 26.9% of study participants were having normal BMD while 62.2% and 10.9% were osteopenic and osteoporotic respectively. Significant association was found with age, parity, occupation, education, SES, BMI, menopausal status, type of activity, addiction while association with residence and marital status was insignificant.

Conclusion: In our study frequency of osteopenia and osteoporosis was quite significant. It is therefore necessary to create awareness among women from Indian subcontinent and educate them regarding preventive measures to avoid future fractures secondary to osteoporosis.

Keywords: Osteopenia, Osteoporosis, BMD

I. Introduction

Osteoporosis is a metabolic bone disease characterized by low bone mass and the deterioration of bone microarchitecture.¹ 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. Osteopenia refers to bone mineral density (BMD) that is lower than normal peak bone mineral density but not low enough to be classified as osteoporosis. Osteopenia increases the risk of osteoporosis and osteoporotic fractures as the person advances to old age. Osteoporosis is three times more common in women as compared to men.² The greatest bone loss occurs in women during perimenopause and is associated with estrogen insufficiency, a condition of menopause. 70% of women over the age 80 years have osteoporosis.³ Indian subcontinent is situated between 8.4° and 37.6°N latitude and majority of the population living here experience perennial sunlight throughout the year and vitamin D through this adequate sun exposure. However, darker skin pigmentation, recent modernization of India resulting in working indoor, and reduced physical activity have resulted in limited sun exposure. The women from Indian subcontinent who have migrated to western countries are at increased risk of accelerated age-related bone loss when compared to their counterparts living in the same geographic region due to their darker skin, conservative dressing such as “Burqa,” “Sari,” and “Salwar kameez,” and their genetic pattern.⁴ This silently progressing metabolic bone disease is widely prevalent in India and osteoporotic fractures are a common cause of morbidity and mortality in adult Indian women. Osteoporosis has numerous medical implications and a huge economic impact. So it is of utmost importance that we take immediate steps to create awareness and treatment of this disease. The main purpose of study was to determine the prevalence of osteopenia and osteoporosis in females in 19 to 65years of age group and to compare the BMD in relation to some of the risk factors.

II. Materials And Methods

This was a prospective cross sectional study carried out over a period of one year (January 2015 to December 2015) in the OPD of a private medical college. The study was approved by the Institutional Ethics Committee. Healthy relatives of patients attending the Orthopaedics OPD during this period were selected.

Written informed consent from all subjects was obtained prior to the study. 1206 females of age group 19-65 were included in this study. Pregnant ladies and females with history of chronic use of steroids and rheumatoid arthritis were also excluded from the study. Dual Energy Absorptiometry (DEXA) is the Gold Standard for bone mineral density; however, Quantitative Ultrasound (QUS) is reliable and cost-effective alternative, which was used in this study and many other similar studies.^{5,6,7} BMD was tested using calcaneal quantitative ultrasound (BMD SONOST 3000) machine(Fig-1). Quantitative Ultrasound of Calcaneus was used to calculate the BMD (Bone Mineral Density) of right heel. Machine converted the BMD values into T-Score. According to the recommendations of World Health Organization (WHO), T-Score < -1 was considered normal; -1 to -2.5 was considered osteopenia; and T-Score > -2.5 was considered osteoporosis.⁸ Epi info 3.4.3 version was used to analyze data. Chi Square test was used to compare various groups. Results were considered significant if p value was < 0.05.

III. Results

Our study included a total of 1206 women, 692 were <30 years, 358 were between 30-45 years, and 156 were >45 years of age. Results reflected that 26.9% of study participants were having normal BMD while 62.2% and 10.9% were osteopenic and osteoporotic respectively.(Table-1) According to age group, 32.1% of the females aged more than 45 years had osteoporosis. Women with higher parity (> 3) had higher occurrence of osteopenia. 55.7% unmarried females and 62.9% of married females were osteopenic. By place of residence no significant difference was observed, 10.6% of rural population and 11% of urban population was osteoporotic and insignificant association was found (p > 0.05). By occupation we divided our study participants into 3 groups; student, housewife and working women. Our study showed that 14.4% of students were osteoporotic while 26.2% and 5.1% of housewife and working women were osteoporotic respectively. Moreover, 66% of females belonging to lower socio economic scale were osteopenic compared to 57% of women of higher socio economic scale. Education in relation to osteoporosis depicted that 22% of illiterate females were osteoporotic while 6.4% of literate females were osteoporotic. 69.3% of the females with BMI < 25 were osteopenic in comparison 51.7% of females with BMI>25. Post menopausal women were significantly more osteoporotic than normal menstruating women. 70.4% of the females with sedentary lifestyles were osteopenic. Women with history of addiction were more osteoporotic than women without addiction. Significant association was found with all the variables except residence and marital status. (Table-2)

IV. Discussion

In India, the precise figures on the prevalence of osteoporosis are not available at present. However, it is estimated that more than 61 million Indians have osteoporosis; of these, 80% patients are females.^{9,10} In our study 62.2% of the subjects were osteopenic, while 10.9% of the subjects were osteoporotic. In a hospital based study among urban women above age of 25 yrs utilizing calcaneal QUS by Sharma et al 20.25% and 36.79% were suffering from osteoporosis and osteopenia respectively.¹¹ While retrospective study using DEXA scan records of 40-60 yrs Indian women by Acharya et al documented 18.41% osteoporotic and 47% osteopenics.¹² In our study frequency of osteopenia and osteoporosis was high among the different age groups. 65.9% females were osteopenic in age group of 31-45 years while 41% were osteopenic in age group >45 years. A study conducted in Tehran is comparable with our results. It depicts that prevalence of osteopenia was 17.4% in females of age-group 20-29 years and was 8.3% in 30-39 years of females.¹³ Our study showed that multiparous females specially having more than 3 children were 75.6% (p<0.05) osteopenic as compared to females having 1-3 children or nulliparous women. This is similar to studies which suggest that multiparity is a risk factor for osteopenia and osteoporosis.^{14,15,16,17} Bone mineral density of urban and rural population reflected that 61.8% of urban population and 62.7% of the rural population was osteopenic. Study results clearly point that both urban and rural population are osteopenic. This is similar to another study conducted in Eastern Poland and found no statistically significant difference in mean values of BMD between urban and rural population.¹⁸ In contrast to that, a study, conducted in Indian population, showed that prevalence of disease was more common in rural population compared with urban population.¹⁹ We found that working women, students and house wives were osteopenic. 58.3% of house wives, 67.6% of working women and 39.7% of students were osteopenic (p<0.05). This is similar to a study conducted in Poland which showed that BMD values of farmers in rural areas and that of nurses, teachers and retired workers in urban areas, were similar with no statistically significant difference.²⁰ Of major interest is the finding that 25.7% postmenopausal group was found to have osteoporosis in comparison to 5.4% in the menstruating group. Similar prevalence of osteoporosis after the age of 50 years has been seen in previous studies by Babu and Vestergaard et al.^{21,22} Association of decreased BMD and sedentary lifestyle, lesser BMI and addiction was also found in our study. An increase in body mass index had a significant impact on BMD. Several studies have shown the positive correlation between BMI and BMD.²² A positive impact of physical activity on bone mass or BMD

demonstrated in our study is probably due to a skeletal response to mechanical strain by stimulating bone formation which has also been established in other studies.²³

V. Conclusion

Osteoporosis 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. In our study frequency of osteopenia and osteoporosis was quite significant. It is therefore necessary to create awareness among women from Indian subcontinent, irrespective of their geographic location, about the risk of osteoporosis and educate those regarding preventive measures to avoid future fractures secondary to osteoporosis. There is also a need for large community-based studies so that high-risk population can be picked up and early interventions like adequate calcium intake, vitamin D supplementation, and other life style changes can be instituted.

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Fig 1: BMD Testing apparatus

Table 1: Distribution of subjects according to BMD (n =1206)

BMD(T SCORE)	Females(%)
Normal(< -1)	325(26.9)
Osteopenia(-1 to - 2.5)	750(62.2)
Osteoporosis(> -2.5)	131(10.9)

Table 2: showing variables, their correlation with osteopenia and osteoporosis

Variables	Bone Mineral Density(BMD)			p value
	Normal(%)	Osteopenia(%)	Osteoporosis(%)	
AGE				
< 30 yrs (n=692)	201(29.0)	450(65.0)	41(6.0)	< 0.05
31- 45 yrs(n= 358)	82(22.9)	236 (65.9)	40(11.2)	
> 45 yrs(n=156)	42(26.9)	64(41.0)	50(32.1)	
PARITY				
0 (n= 142)	38 (26.8)	95 (66.9)	9(6.3)	< 0.05
1-3(n= 756)	239(31.6)	422(55.8)	95(12.6)	
>3 (n=308)	48(15.6)	233(75.6)	27(8.8)	
OCCUPATION				
Working (n= 796)	217(27.3)	538 (67.6)	41(5.1)	< 0.05
Non working (n=264)	41(15.5)	154(58.3)	69(26.2)	
Students(n= 146)	67(45.9)	58(39.7)	21(14.4)	
EDUCATION				
Literate (n= 863)	254 (29.4)	554 (64.2)	55 (6.4)	< 0.05
Illiterate (n=343)	71(20.7)	196(57.1)	76(22.2)	
SES				
High(n= 259)	90(34.7)	148 (57.2)	21 (8.1)	< 0.05
Middle (n=380)	110 (28.9)	228 (60.0)	42(11.1)	
Low(n= 567)	125(22.0)	374(66.0)	68(12.0)	
MARITAL STATUS				
Married (n= 1084)	292 (26.9)	682(62.9)	110(10.2)	>0.05
Unmarried(n=122)	33(27.0)	68(55.7)	21(17.3)	
RESIDENCE				
Urban(n= 625)	170 (27.2)	386 (61.8)	69 (11.0)	>0.05
Rural(n=581)	155(26.7)	364(62.7)	62(10.6)	
BMI				
< 25 (n=720)	131(18.2)	499(69.3)	90(12.5)	< 0.05
>25(n= 486)	194 (39.9)	251(51.7)	41 (8.4)	
MENSTRUAL STATUS				
Menstruating(n=904)	296(32.7)	560(61.9)	48 (5.4)	< 0.05
Post menopausal(n=302)	29(9.6)	190(62.9)	83(27.5)	
TYPE OF ACTIVITY				
Sedentary (n=855)	201(23.5)	602(70.4)	52 (6.1)	< 0.05
Moderate (n=247)	104(42.1)	103(41.7)	40 (16.2)	
Hard(n= 104)	20(19.2)	45(43.3)	39(37.5)	
ADDICTION #				
Yes (n= 178)	38(21.3)	82(46.1)	58(32.6)	< 0.05
No(n=1028)	287(27.9)	668(65.0)	73(7.1)	

any form of tobacco/alcohol/both