

## The prevalence of osteoporosis and associated factors among health care professionals

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### Abstract

*Osteoporosis is a growing health problem recognized in both developed and developing countries. It is associated with substantial morbidity and socio-economic burden worldwide. Thirty to fifty percent of women and 15%–30% of men suffer from osteoporosis-related fractures in their lifetime. A cross-sectional study was carried out to determine the prevalence of osteoporosis among the employees of Pravara Medical Trust, Loni, Maharashtra, India. Bone mineral density (bone mass) was assessed by speed of sound using a Quantitative Ultrasound device (CM-100; ELK Corporation, Tokyo, Japan) at the calcaneum. Based on World Health Organization's guidelines, T-score (ratio between patients Bone Mineral Density and that of young adult population of same sex and ethnicity) of  $> -1$  was taken as normal, between  $-1$  to  $-2.5$  osteopenic and  $< -2.5$  as osteoporotic. The overall prevalence of osteoporosis was 28.03% while osteopenia was evident in 31.06% of study subjects. Significant association of osteoporosis was evident with risk factors like chronic diseases (hypertension, diabetes, ischemic heart disease etc.), lack of exercise, alcoholism/smoking and positive family history.*

**Key Words:** Osteoporosis, T Score, Health professionals

### Introduction

Osteoporosis is a growing health problem recognized in both developed and developing countries associated with substantial morbidity and socio-economic burden worldwide.<sup>[1]</sup> Osteoporosis is a disease characterized by reduction in the bone mass and disruption of bone architecture leading to impaired skeletal strength and an increased susceptibility to fractures.<sup>[2]</sup> It is a 'silent disease' which does not have a dramatic clinical presentation except when fracture results due to trivial trauma. The hip, spine and distal forearm bones are the typical sites of osteoporotic fractures. These fractures lead to serious disability and the hip fractures are associated with high mortality.

30%–50% of women and 15%–30% of men suffer from osteoporosis-related fractures in their lifetime.<sup>[3]</sup> A group of experts in 2003 suggested that 26 million Indians suffer from osteoporosis making India one of the largest affected countries in the world.<sup>[4]</sup> This number is estimated to rise to 36 million by 2013.<sup>[4]</sup> In most Western countries, while the peak incidence of osteoporosis occurs at about 70-80 years of age, in India it may afflict those 10-20 years younger, at age 50-60.<sup>[5]</sup>

Bone mineral density (BMD) is the best available means to assess bone strength and the only important tool in the early diagnosis of osteoporosis, so that effective preventive and therapeutic measures can be initiated at the earliest. The gold standard for measuring bone density however is the Dual energy X-ray absorptiometry (DEXA), useful tool for both the axial and appendicular skeleton as the detection rate of osteopenia and osteoporosis is higher with it in comparison to calcaneal quantitative ultrasound (QUS) method.<sup>[6]</sup> However, DEXA is non portable, expensive and exposes to significant dose of ionizing radiation, therefore not ideally advocated for community based studies. Whereas the QUS method is portable, cost effective and free from

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radiation hazards and hence ideal for community based studies.

Although the focus of attention in the past has been on the communicable diseases by public health authorities but recently, this focus has been shifted to non-communicable diseases which are associated with high morbidity and mortality. The present study was undertaken to determine the prevalence of osteoporosis among the staffs of Pravara Medical Trust (PMT), Loni, Maharashtra using calcaneal QUS method and uncover the associated risk factors.

### Materials and Methods

A cross sectional study was carried out in the month of May 2010 among the employees of PMT, Loni. Ethical clearance was obtained from the Institutional Ethical Committee. The employees were classified into 4 categories- teaching staff/doctors, nurses, technical staff and other employees (ward boys, sweepers and peons).

A non stratified sampling technique was used to obtain a sample size of 278. However only 264 (94.96%) subjects were considered for data analysis as sufficient information on sociodemographic factors and past history were lacking in 14 subjects. Socio-economic status was assessed according to modified BG Prasad classification based on Consumer Price Index of April 2006.<sup>[7]</sup> Bone mass was assessed by speed of sound (m/second) using a QUS device (CM-100; ELK Corporation, Tokyo, Japan). This device was small and portable, with a gel-coupled (dry) system that can measure speed of sound at the calcaneum. Coefficients of variation for the device were measured short term in vivo and in vitro. Precision error (percent coefficient of variation) using the phantom technique was 0.15 percent and, in vivo, was 0.27 percent.<sup>[8]</sup> The measurement was taken in a temperature-controlled environment and was performed by a trained medical technician. Standardization and calibration with standards were performed before the first measurement of each

survey day. Based on WHO guidelines, T-score (ratio between patients BMD and that of young adult population of same sex and ethnicity) of  $>-1$  was taken as normal, between  $-1$  to  $-2.5$  osteopenic and  $<-2.5$  as osteoporotic.<sup>[9]</sup> Systemic diseases like renal and hepatic disorders, rheumatoid arthritis, endocrine disorders like thyrotoxicosis, hyperparathyroidism, Addison's disease, Cushing syndrome and prolonged immobilization and women with oophorectomy were excluded from the study. Women on long term medication affecting the bone turnover (steroids, heparin, warfarin, thyroxine, hydrocortisone, phenytoin sodium, hormone replacement) were also excluded. A pre-designed and pre-tested questionnaire was used for the data collection. The purpose of the study was explained to the subjects and their consent taken. Data was analyzed in the form of percentages and proportions and chi-square test was applied and  $p < 0.01$  was taken as statistically significant.

The 264 subjects recruited for study belonged to age group 21 to above 61 years. The overall prevalence of osteoporosis was observed at 28.03% while osteopenia was evident in 31.06% study subjects. The mean T score was 1.71 (SD  $\pm$  1.15). Osteoporosis and osteopenia was seen in 23.33% and 26% males respectively while the two conditions among female stood at 34.21% and 37.72% respectively (also see table 2). Highest prevalence of osteoporosis was seen in the age group 61 and above (42.86%) followed by age group 51-60 years and 41-50 years as 33.33% and 29.90% respectively. Total incidence of osteopenia and osteoporosis increased significantly after age group of 41-50 years. Among total (39) osteoporotic women, maximum prevalence was evident in age group 61 and above (42.86%) which also showed similar prevalence of osteopenia (42.86%). An age wise increasing trend was seen in the prevalence of both osteopenia and osteoporosis.

Graduates (30.21%) followed by those with education up to secondary level (30.01%) showed similar prevalence of osteoporosis. The association of socioeconomic factor with osteoporosis was

## Results

The demographic details of the study population are shown in table 1.

Table 1: Demography of patients

Gender	No. (%)
Male	150 (56.82)
Female	114 (43.18)
Total	264 (100)
Age Group	
21-30 years	34 (12.88)
31-40 years	38 (14.39)
41-50 years	97 (36.74)
51-60 years	74 (28.03)
61 years and more	21 (7.96)
Mean Age (in years), (SD)	45.11 (10.95)
Education	
Graduate and above	176 (66.67)
Intermediate/Matric	50 (18.94)
Secondary	26 (9.85)
Primary	12 (4.54)
Illiterate	0 (0)
Occupation	
Teaching Staff/Doctors	57 (21.59)
Nursing Staff	60 (22.73)
Technical	75 (28.41)
Other Employees	72 (27.27)
Socioeconomic Status	
Upper	72 (27.27)
Upper Middle	68 (25.76)
Middle	60 (22.73)
Lower Middle	50 (18.94)
Lower	14 (5.30)
Dietary Habit	
Vegetarian	166 (62.88)
Non vegetarian	17 (6.44)
Mixed	81 (30.68)

\* Data in parenthesis indicates percentage

insignificant ( $t=2.14$ ,  $p>0.05$ ). Other employees (ward boys, peons and sweepers) showed a very high prevalence (36.11%) of osteoporosis followed by teaching staffs/doctors (33.33%) (also see table 3). 43.4% osteoporotic males and females gave the history of alcohol or tobacco consumption. Of all the osteoporotic and osteopenic women, 80% and 50% were post menopausal respectively (also see table 4).

## Discussion

The present study, using QUS for measuring BMD revealed an overall prevalence of osteoporosis as 28.03%. The females showed a higher prevalence (34.21%) as compared to males (23.33%). Pande KC<sup>[10]</sup> using digital X-ray radiogrammetry revealed that 29.9% of women and 24.3% of men between the age of 20 and 79 years had low bone mass. However our study revealed a higher prevalence for both the categories. There is a significant association seen between the estimated risk factors like chronic diseases such as diabetes, hypertension, and ischemic heart disease etc, lack of exercise, alcohol consumption/cigarette smoking and family history with the prevalence of osteoporosis. The profession of the subjects showed no significant relationship with the 'silent disease'. However the high prevalence among teaching staff/doctors and other employees like peons, sweepers, and ward boys are due to sedentary lifestyle in the former and low calcium intake as well as increased consumption of alcohol/ cigarette smoking in the latter. Women are always at higher risk of developing osteoporosis particularly at post-menopausal age which has also been observed in our study as well as studies conducted by others.<sup>[11, 12]</sup> Advancing age also increases the risk of osteoporosis in both genders as revealed in our study. Similar observations were also recorded by Sharma S et al<sup>[11]</sup> and Chibber G et al.<sup>[12]</sup>

## Conclusion

There is high prevalence of osteoporosis among health care professionals as compared to general adult male (10-15%) and female (20%) population of India. As osteoporosis is related to considerable mortality and increasingly higher costs of health care, screening for osteoporosis, particularly in high-risk populations is required. Proper education about the disease can help,

Table 2: Age-wise prevalence of osteopenia and osteoporosis in study population.

Age Group (in years)	Normal	Osteopenia	Osteoporosis	Total
21-30				
Male	15(83.34)	2 (11.11)	1 (5.55)	18
Female	11 (68.75)	3 (18.75)	2 (12.5)	16
Total	26 (76.47)	5 (14.71)	3 (8.82)	34 (12.88)
31-40				
Male	15 (57.69)	6 (23.07)	5 (19.24)	26
Female	5 (41.67)	4 (33.33)	3 (25)	12
Total	20 (52.63)	10 (26.32)	8 (21.05)	38 (14.39)
41-50				
Male	26 (50.98)	13 (25.49)	12 (23.53)	51
Female	11 (23.91)	18 (39.13)	17 (36.96)	46
Total	37 (38.15)	31 (31.95)	29 (29.90)	97 (36.74)
51-60				
Male	17 (40.48)	13 (30.95)	12 (28.57)	42
Female	5 (15.62)	14 (43.75)	13 (40.63)	32
Total	22 (29.73)	27 (36.49)	25 (33.78)	74 (28.04)
61 & above				
Male	3 (23.08)	5 (38.46)	5 (38.46)	13
Female	0	4 (50)	4 (50)	08
Total	3 (14.28)	9 (42.86)	9 (42.86)	21 (7.95)
Total	108 (40.91)	82 (31.06)	74 (28.03)	264 (100)

\* Data in parenthesis indicates percentage

Table 3: Profession-wise prevalence of osteopenia and osteoporosis in study population

Profession	Normal	Osteopenia	Osteoporosis	Total
Teaching Staff/Doctors	16 (28.07)	22 (38.6)	19 (33.33)	57
Nurses	38 (63.34)	10 (16.66)	12 (20.0)	60
Technical Staff	38 (50.66)	20 (26.67)	17 (22.67)	75
Other Employees	16 (22.23)	30 (41.66)	26 (36.11)	72
Total	108 (40.91)	82 (31.06)	74 (28.03)	264

\* Data in parenthesis indicates percentage

Table 4: Distribution of Bone Mass Density (BMD) with relative risk factors

Table 4: Distribution of Bone Mass Density (BMD) with relative risk factors				
	Chronic diseases	Lack of exercise **	Smoking/ alcohol ***	Family history ****
Normal	18 (16.82)	22(19.64)	41 (31.06)	8 (17.02)
Osteopenia	32 (29.91)	45 (40.18)	39 (29.55)	21(44.68)
Osteoporosis	57 (53.27)	45 (40.18)	52 (39.39)	18(38.3)
Total	107	112	132	47
$\chi^2 = 61.64, p < 0.001$ ; $\chi^2 = 36.95, p < 0.001$ ; $\chi^2 = 18.62, p < 0.001$ ; $\chi^2 = 13.541, p = 0.001$ Data in parenthesis indicates percentage				

not only at individual level but also at community level. The present study suggests that calcaneal QUS method utilizing same WHO T score criteria is an attractive screening tool because of the low cost, feasibility and help in identifying osteopenia and osteoporosis in people working in tertiary care hospital who otherwise would remain undiagnosed and subsequently develop complications of osteoporosis. The method can be used for wider community surveys to identify the extent of problem in various ethnic groups.

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