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**Alomib Austina Ribanar**  
Department of Food Science and  
Nutrition, CCSc, University of  
Agricultural Sciences,  
Dharwad, Karnataka, India

**Usha Malagi**  
Department of Food Science and  
Nutrition, CCSc, University of  
Agricultural Sciences,  
Dharwad, Karnataka, India

## Prevalence of osteoporosis in Dharwad district, Karnataka

**Alomib Austina Ribanar and Usha Malagi**

### Abstract

Osteoporosis is recognized as a public health problem, with about 200 million people being affected worldwide. The aim of the study was to measure the prevalence of osteoporosis in Dharwad district. Bone mineral density of 1263 subjects >35 years of age using qualitative ultrasound (QUS) was assessed. The patients were interviewed regarding the general information, height and weight were measured, and BMI was calculated. They were classified into normal, osteopenia and osteoporosis category on the basis of T-score from QUS. The prevalence of osteoporosis and osteopenia in Dharwad district were 33.8 per cent and 41.6 per cent respectively. The prevalence of osteoporosis was higher in the urban locality among the older age group. The prevalence of osteoporosis was common among the female population who were post-menopausal. Positive association was found between increased age, female gender, menopause, & low BMD Score.

**Keywords:** Body mass index, bone mineral density, menopause, osteoporosis, prevalence

### Introduction

Osteoporosis is recognized as a public health problem, with about 200 million people being affected worldwide (Anonymous, 2017) [1]. Globally, the economic burden of osteoporosis parallels expenditures for osteoporotic fractures (Cummings *et al.*, 2002) [5]. According to the World Health Organization Health Report 70 million people worldwide are diagnosed to have osteoporosis, and 50% of them have the estimated lifetime risk of osteoporotic fracture, especially in white and Asian women. The incidence of osteoporosis in women at the age of 50 years is 1 in 3 and this increases to 1 in 2 when they approach the age of 60, in male 1 out of 5 are osteoporotic at the age of 50 and this incidence increases to 1 in 3. Burden of osteoporosis is increasing in India. According to the International Institute of Health Osteoporosis and related Bone Diseases 2004 the annual incidence of osteoporosis is more than the combined incidence of heart attack or breast cancer in women. The osteoporotic fracture risk experienced by a man of the age of 50 years is estimated to be 30 per cent similar to the risk of the prostate cancer development. Average age of world's population is shifting upward, thus increasing the incidence and prevalence, and burden of osteoporosis. It is a global problem affecting both women and men. Among women, the worldwide prevalence of osteoporosis rises from 5 per cent at the age of 50 years to 50 per cent at 85 years of age whereas among men, the prevalence is 2.4 per cent and 20 per cent respectively. Hence, the objective of the study is to measure the prevalence of osteoporosis in Dharwad district, Karnataka.

### Material and Methods

To know the prevalence of osteoporosis in Dharwad district, a two-stage sampling technique was used. Out of the five talukas (Dharwad, Hubli, Kalghatgi, Kundgol and Navalgund) of Dharwad district, 50 per cent *i.e.* two talukas (Dharwad and Hubli) were selected. In six areas of Hubli and Dharwad talukas (3 areas each), bone mineral density (BMD) testing camp was conducted. A total of N=1263 (Dharwad (n) = 746; Hubli (n) = 517) subjects above 35 years of age were volunteer who participated in the prevalence study. A detailed questionnaire was developed to collect the data on general information and nutritional status. Nutritional status was assessed by measuring height and weight. Body Mass Index (BMI) was computed. Bone mineral density (BMD) was determined by using calcaneal quantitative ultrasound (QUS). The study was approved by ethical committee and consent was taken from the participants. The data obtained was analyzed statistically using SPSS package (version 23). Chi square were used to determine the association between the prevalence of osteoporosis and selected variables.

**Corresponding Author:**  
**Alomib Austina Ribanar**  
Department of Food Science and  
Nutrition, CCSc, University of  
Agricultural Sciences,  
Dharwad, Karnataka, India

## Results and Discussion

The demographic profile of the participants who attended the health camps is presented in Table 1. Among 1263 participants, almost equal percentage belonged to the rural and urban areas (48.9 and 51.1%) and were males and females (48.1 and 51.9%). Majority of the participants (26.9%) were graduates, followed by intermediate (25.7%) and 12.4 per cent were illiterates. Higher percentage (42.4%) of the subjects belonged to the low-income group (5,000 rupees/per month), and very few were in the income group of more than 50,001 rupees (3.7%). Among 607 women participants, majority of the women (65.7%) were post- menopausal and 34.3 per cent were pre-menopausal women.

The results (fig. 1) showed that about 41.6 per cent had osteopenia (t-score between -1 to -2.5), one third were

osteoporotic (t-score <-2.5; 33.8%) and 24.6 per cent had normal BMD (t-score > -1). In a study among Indian women aged 30-60 years from low income groups, BMD at all the skeletal sites were much lower than values reported in the developed countries, with a high prevalence of osteopenia (52%) and osteoporosis (29%). Similar studies have been reported by Abirami *et al.* (2017) [2] studied middle aged women and found 28 per cent osteoporosis prevalence in Kancheepuram and Modagan *et al.* (2018) [9] noted 24.7 per cent osteoporosis in South India. And some had reported higher prevalence of osteoporosis (50%) (Hemalata *et al.*, 2016) [6]. The difference in the prevalence in the present study compared to the others may be attributed to the genetic variations, food habits, lifestyle factors and regional variations.

**Table 1:** Demographic profile of the subjects attending the health camp. (N=1263)

Parameters	Frequency (n)	%
<b>Locality</b>		
Rural	618	48.9
Urban	645	51.1
<b>Gender</b>		
Male	607	48.1
Female	656	51.9
<b>Education</b>		
Illiterate	156	12.4
Primary	222	17.6
Matriculation	170	13.5
Intermediate	325	25.7
Diploma	2	0.2
Graduate	340	26.9
Post-graduate	45	3.6
Doctorate	3	0.2
<b>Monthly income</b>		
<5000	537	42.5
5001-10000	95	7.5
10001-30000	360	28.5
30001-50000	225	17.8
>50001	46	3.6
<b>Menopausal status of women (N=607)</b>		
Pre-menopausal women	208	34.3
Post-menopausal women	399	65.7

When the prevalence of osteoporosis was compared between urban and rural localities higher percentage of urban subjects belonged to the osteoporotic and osteopenic categories compared to the rural locality (36 Vs 31.6% and 42.3 and 40.8% respectively). There was a significant association between the BMD and the locality ( $p \leq 0.05$ ,  $\chi^2 = 6.56$ , Fig. 2). This indicates that people living in urban areas are more prone to the osteoporosis than the rural counterparts. The reason for this may be due to changes in the lifestyle and food habits of urban people. They do not find time to exercise due to the busy lifestyle and tend to eat more processed and ready to eat foods rich in sugar, salt and refined foods low in calcium. Their exposure to sunlight is also lower. On the other hand, rural people have active lifestyle and they do lot of hard work and eat natural foods and exposure to sunlight is greater. Sanga *et al.* (2018) [12] reported higher incidence of osteoporosis in urban areas compared to the rural.

When the prevalence of osteoporosis was classified according to the gender (Fig. 3), higher no. of the females was osteoporotic compared to the males (39.2 Vs 28.8%). However, more no. of males was higher in the normal BMD categories than females. These differences among the gender

for osteoporosis and normal was found to be significant ( $p \leq 0.05$ ) and the association between the BMD and gender was found to be highly significant ( $p \leq 0.001$ ;  $X^2 = 26.34$ ). Similar studies have been reported by various authors. Chitten and James (2018) [4] and Kaushal *et al.* (2018) [8] have reported higher prevalence among females compared to males. Women have lower BMD compared to men; they acquire lower bone peak mass during the lifetime. The bone resorption starts at menopause due to cessation of estrogen and at younger age than the males, Males show the decreasing BMD 10 years later than females. One out of 5 males suffer from osteoporosis and 1 out of 3 females have this at the age of 50 years. Prevalence of osteoporosis based on the age has been presented in Fig. 4. Prevalence of osteoporosis and osteopenia was found to be higher in age groups of 60-69, 70-79 and more than 80 years (Osteoporosis: 43.7, 42.2 and 49.3%; Osteopenia: 48, 53.7 and 50.7% respectively) compared to the age group less than 40-49 and less than 39 years (Osteoporosis: 22 and 21%; osteopenia: 32.4 and 37.1% respectively). There was a significant ( $p \leq 0.001$ ,  $X^2 = 185.12$ ) association between the age and BMD. With the increase in the age there was a gradual decrease in the BMD. Increasing

age is one of the strongest predictors of future fracture. Some of the age-related changes in fracture risk are related to a reduction in BMD. The lower protein intake, higher proportion of 25 (OH) D<sub>3</sub> deficiency, reduced sex hormones and bone turnover rates due to aging might partly explain the results. Bones become thinner and weaker as aging progresses. Qureshi *et al.* (2017) [11] reported that age wise maximum prevalence in the age group of 71-80 years (31.81%). Aravapalli and Venugopal (2016) found that the prevalence of osteoporosis was found to be high (73%) among women in the age group of 51-60 years compared to that of 41-50 years (27%). Kaushal *et al.* (2018) [8] reported that the prevalence of osteoporosis increased with age in female subjects but not in male subjects.

The incident of occurrence of osteoporosis decreases as the BMI increases although it can affect in all the category (Fig. 5). The distribution of the BMI based on BMD was highly significant ( $p \leq 0.01$ ,  $\chi^2 = 30.20$ ). The prevalence of osteoporosis and osteopenia was highest (60 and 40% respectively) when the BMI was less than 18.50. and lowest when the BMI is more than 40 (45.50 and 27.30%). Low BMI is a well-documented risk for future fractures. Risk is more marked for individuals of BMI <20 kg/m<sup>2</sup>. This may be due to lower bone peak mass during the growing years. Morin *et al.* (2009) [10] have reported similar results. Decrease in BMI was associated with 19 per cent increase in risk of fracture. The reason for the association of higher BMI ( $\leq 35$  kg/m<sup>2</sup>) with osteoporosis may be due the common sharing of the genetic factors and molecular pattern by the fat and bone mass, that appears to have opposite effects on fat versus bone mass. The people with higher fat percentages are at greater risk of lower BMD (Zhao *et al.*, 2007) [13].

When the reproductive health of a woman was considered (Fig. 6), the distribution of BMD among the pre-menopausal and post-menopausal women shows statistically significant difference ( $p \leq 0.001$ ,  $\chi^2 = 98.98$ ). There was a higher incidence of osteoporosis and osteopenia with 47.90 and 44.40 per cent respectively among post-menopausal women

whereas the incidence was lowered in pre-menopausal women. Pre-menopausal women had 37.50 per cent osteopenia and 22.60 per cent osteoporosis. This may be due to drop in the estrogen levels leading to bone loss. Postmenopausal women showed a rapid decline in BMD with age (Kadam *et al.*, 2018) [7]. The prevalence of osteoporosis was found to be high (48.5%) in post -menopausal women in Jharkhand (Sanga *et al.*, 2018) [12].

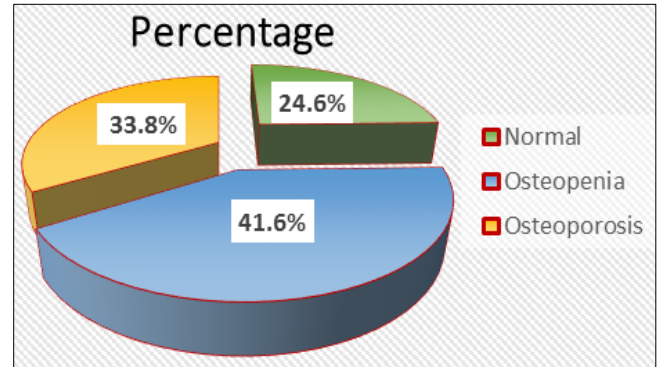


Fig 1: Prevalence of osteoporosis in the Dharwad district (N=1263)

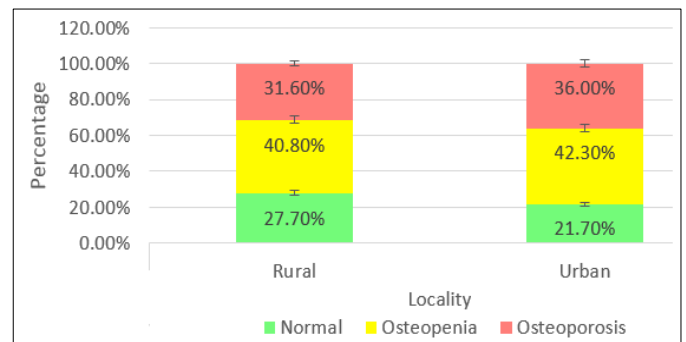


Fig 2: Prevalence of osteoporosis based on locality

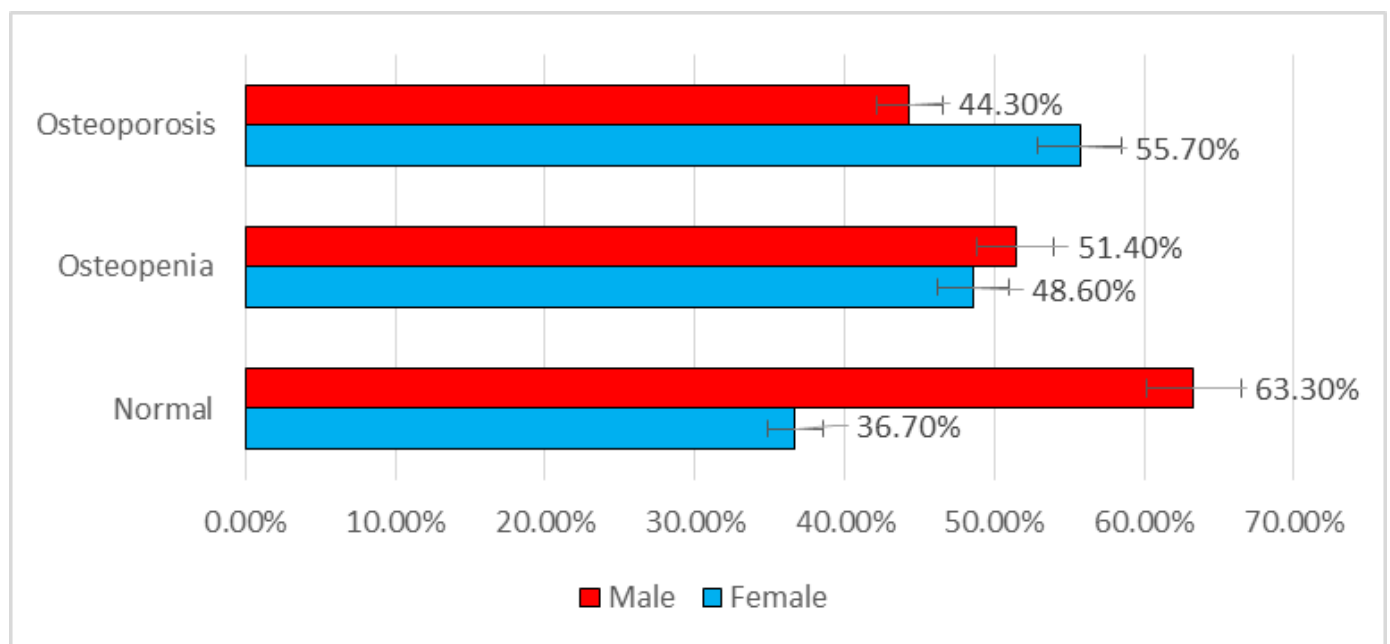
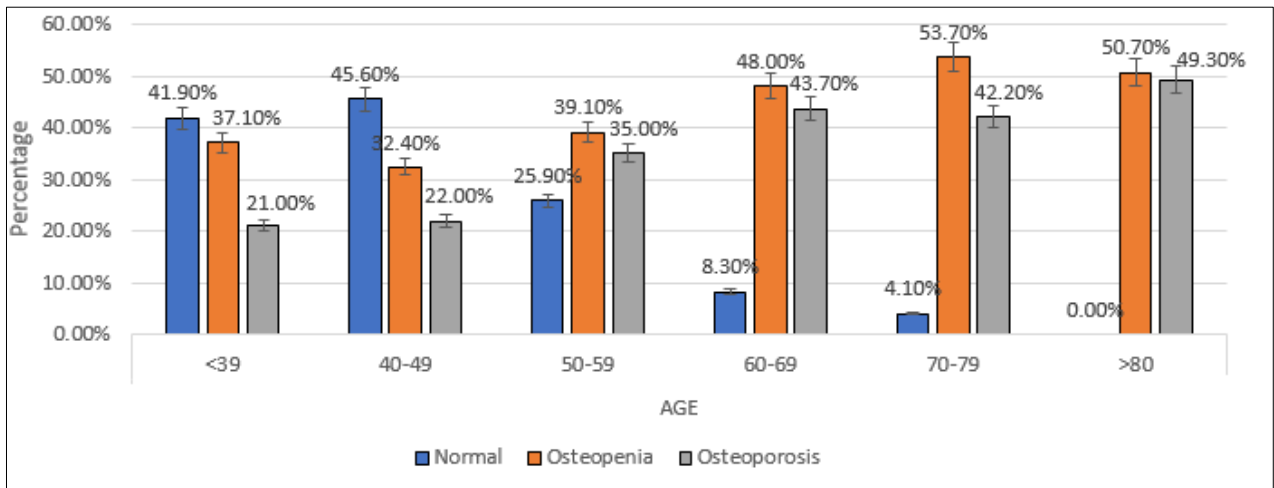
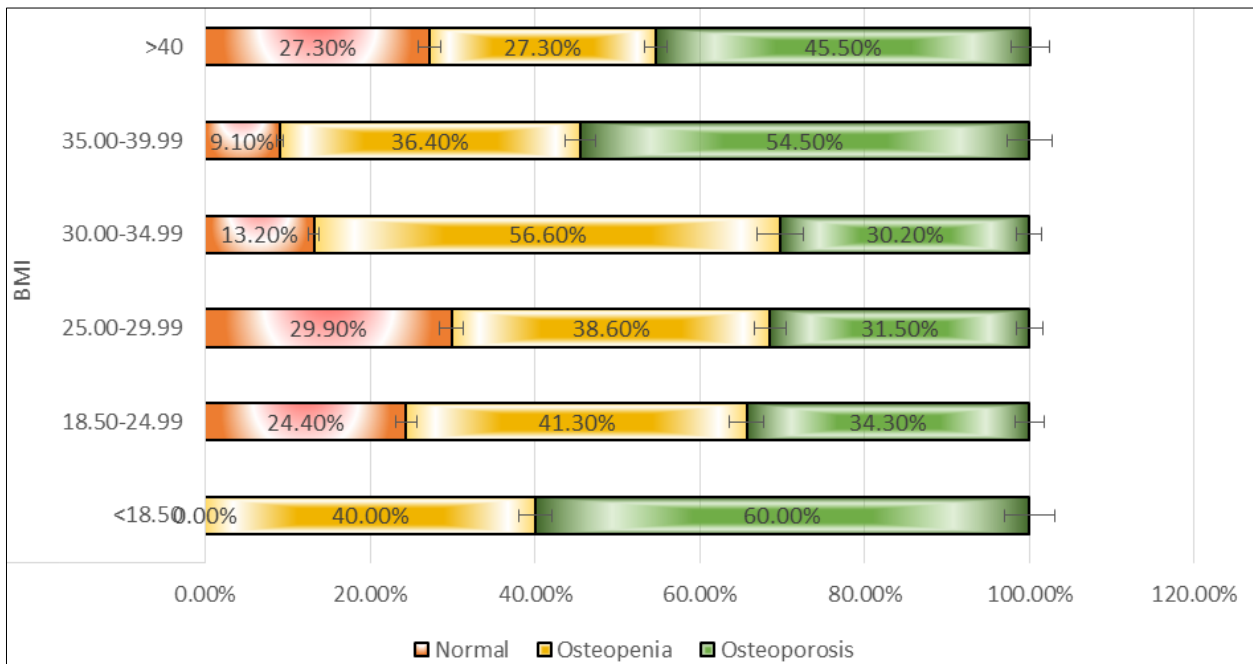


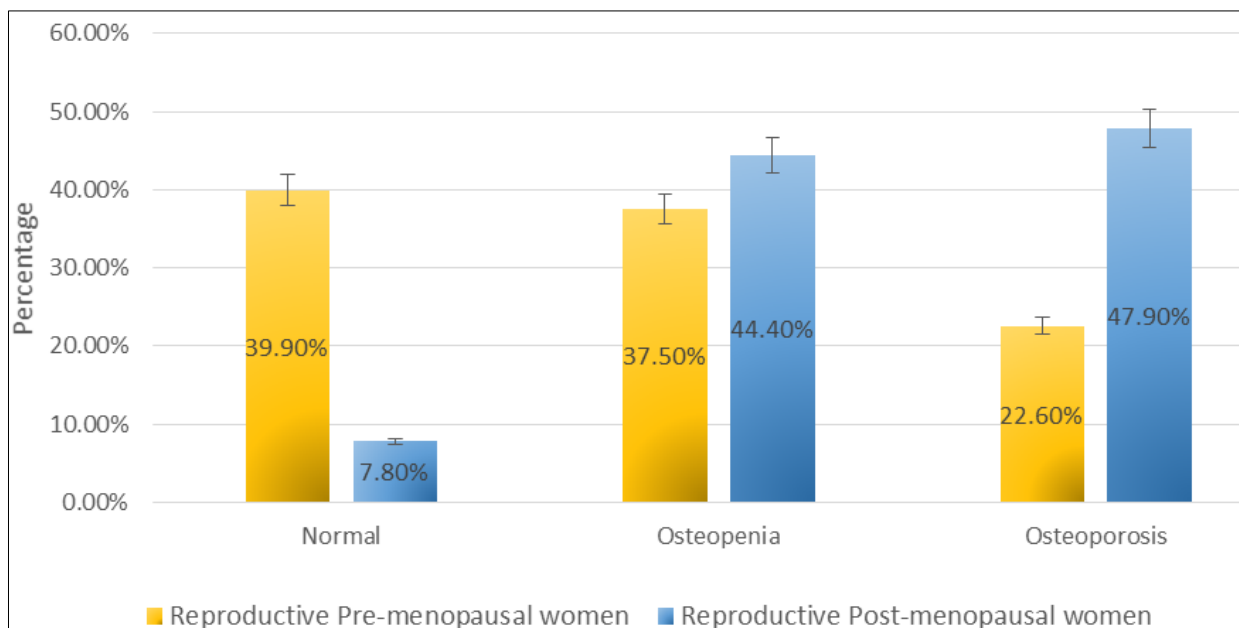
Fig 3: Prevalence of osteoporosis based on gender



**Fig 4:** Prevalence of osteoporosis based on age



**Fig 5:** Prevalence of osteoporosis based on BMI



**Fig 6:** Prevalence of osteoporosis based on menopausal status of women

## Conclusion

Osteoporosis is a significant public health problem in later stage of life in both genders. From the above study it can be concluded that, prevalence of osteoporosis was higher in the urban locality among the older age group of lower income status. The prevalence of osteoporosis was common among the female population who were post-menopausal. It was found that Calcaneal QUS can be used as a baseline screening tool to assess BMD. Positive association was found between increased age, female gender, menopause, low educational status, & low BMD Score.

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