

## ORIGINAL ARTICLE

# Prevalence of osteoporosis among elderly women living in Delhi and rural Haryana

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### ABSTRACT

**Introduction:** The prevalence of osteoporosis and low bone mass is expected to increase worldwide with increased aging of the population. Across the globe, the number of individuals aged 65 years and greater is expected to increase nearly five fold between 1990 and 2050, from 323 million to 1.55 billion.

**Objectives :** We planned to study the prevalence of osteoporosis among postmenopausal women above the age of 60 years from Delhi and rural Haryana by measuring their BMD using DXA.

**Material and Methods:** Apparently healthy women living in seven residential areas of Delhi and 10 villages of neighboring rural Haryana were invited for bone mineral density (BMD) assessment at our hospital after a team of doctors and social workers spoke to them about osteoporosis and the role of BMD in osteoporosis screening. BMD measurement was done with a Hologic QDR4500A machine.

**Results:** Four hundred and thirty women (305 from Delhi and 125 from Haryana) in the age group of 60 to 79 years underwent BMD assessment. Amongst them 265 (53% from Delhi and 76% from Haryana) were osteoporotic by WHO criteria. Mean height of women with osteoporosis was not significantly different from those without osteoporosis; however osteoporotic women had lower bodyweight (51kgs vs 63 kgs). Seven percent of osteoporotic women had suffered one or more fractures, forearm constituting 5% followed by hip fracture.

**Conclusion:** We concluded that using DXA for bone mineral density the estimated prevalence of osteoporosis in our study population was 62%. However, it was less among affluent urban post menopausal women who had more years of formal education. There was no significant difference in height or menopausal age, but there were a significant difference in the BMI (26.95 vs.21.6). [IJEM 2007;11(1&2) 11-14]

**Key Words:** Osteoporosis, bone mineral density, DXA, fragility fractures.

### INTRODUCTION

Osteoporosis affects millions of people worldwide. Individuals with osteoporosis are at high risk of suffering one or more fractures which are often physically debilitating and can potentially lead to a downward spiral in physical and mental health (1). Due to improved nutritional status and better health care facilities there is an increased life expectancy. The prevalence of osteoporosis and low bone mass is expected to increase worldwide with increased aging of the population. Across the globe, the number of individuals with age 65 years and greater is expected to increase nearly five fold between 1990 and 2050, from 323 million to 1.55 billion. This trend alone could result in a 3.7 fold increase in the number of

hip fractures worldwide from an estimated 1.7 million in 1999 to a projected 6.3 million in 2050 (2).

Given the global figures, the problem of osteoporosis and associated fragility fractures, besides other health problems in the elderly, is likely to emerge as a major health problem. This risk of osteoporotic (fragility) fractures increases with age and is greatest in elderly women given their hypoestrogenic state (3). Approximately 10 million individuals over the age of 50 in U.S.A have osteoporosis of the hip. An additional 33.6 million individuals over the age of 50 have low bone mass or osteopenia of the hip and thus are at risk of developing osteoporosis at any site in the skeleton(4). Roughly 4 in 10 white women aged 50 years or older in the US will experience a hip, spine or wrist fracture sometime during the remainder of their lives(5). For Caucasian women, the life time risk of hip fracture is one in six (17.5%) (6). Analysis in Sweden found that increased life expectancy increased the life time risk of hip fracture from 14 to 23%

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in women(7). Japanese data indicates the prevalence of osteoporosis at the lumbar spine to be as high as or greater than in white women, while the prevalence of osteoporosis at the hip (12%) is lower(8). Fracture rates tend to vary across countries. Wrist and hip fracture rates in the UK are around 30% lower than in the US. Hip fracture rates vary more than seven fold from one country to another within Europe(9,10).

While osteoporosis is a well recognized public health problem associated with increased morbidity and health care costs amongst the elderly in the developed countries, there is scarcity of epidemiological data on the magnitude of the problem in India, where few community based studies have been done. Moreover, in India, priority has been given to health problems like infectious diseases, malnutrition etc. which are perceived to be more important from a public health view point and little attention has been paid to non-communicable diseases (11). In India, although the percentage of aged persons to the total population is low in comparison to the developed countries, nonetheless the absolute size of the aged population is considerable. The current elderly population in India constitutes about 7% (12). This is expected to grow to 160 million (and constitute 15% of the population) by the year 2025 (12). The projected figures for gender distribution of the elderly population shows that the sex ratio is in favor of women in the higher age group (70 years and above) (11,12). There is an urgent need for a study to provide the much needed community based information regarding the magnitude of osteoporosis and its far reaching ramifications in India. Presented here is a study conducted in three different socio-economic groups of Delhi and rural Haryana, to assess the prevalence of osteoporosis using BMD measurements.

## MATERIALS AND METHODS:

### Study population

Subjects for this study were postmenopausal women >60 years of age from three different socio-economic and cultural backgrounds (urban affluent, urban lower socio-economic strata (ULSES) and rural). Urban women and slum dwellers from Delhi and rural agricultural women from neighboring Haryana were invited to a voluntary participation in the study.

### Methods

Seven residential colonies of Delhi and 10 villages of rural Haryana were selected for this study. The study team contacted the Resident Welfare Associations in the urban areas and organized health awareness talks emphasizing the utility of DXA measurements for assessment of BMD and hence bone health.

For the urban slums, we contacted the doctors working in those areas and organized small group meetings to give

educational talks. For the villages we contacted a Non Government Organization (NGO) working in the area and held several meetings with the village Sarpanch and other elders regarding the importance of bone health and its measurements to screen for osteoporosis.

Post menopausal women in the age group of 60 years and above were invited to the All India Institute of Medical Sciences, New Delhi where a detailed medical history was taken and physical examination was performed. Anthropometric measurements were taken which included weight and height by fixed wall stadiometer. Bone density was measured by Hologic Densitometer QDR4500A machine at the hip and lumbar spine. WHO criteria was used for the diagnosis of osteoporosis and osteopenia.

## RESULTS:

Four hundred and thirty women in the age group of 60 to 80 years took part in the study, of which 125 were from rural Haryana, 250 from affluent urban areas of Delhi, and 55 were from the lower socio- economic strata (LSES) in Delhi. The clinical profiles of these subjects are given in Table 1. The mean ages of the women were  $63.92 \pm 4.5$ ,  $65.77 \pm 5.0$  and  $63.17 \pm 4.11$  years respectively. The ages at menopause were 48.91, 47.86, and 48.77 years respectively. Seven percent of osteoporotic women had suffered one or more fractures, forearm constituting 5 % followed by hip fracture. Their mean weights were 50.6, 62.18, and 52.40 kgs respectively. Their BMI was 21.59, 26.95, and 23.08  $\text{Kg/m}^2$  respectively. Details of bone density are given in table 2. Thirty nine of 430 women had normal bone density while 265(62%) were osteoporotic. The prevalence of osteoporosis was significantly less among the affluent urban women (52% vs. 73% and 76%) [Table 3].

Table 1: Clinical and anthropometric data of 430 post menopausal women

Parameter	Rural	Urban Affluent	ULSES
Age			
Mean $\pm$ S.D	$63.92 \pm 4.37$	$65.77 \pm 5.00$	$63.17 \pm 4.11$
(Range)	(60-79)	(60-79)	(60-73)
Age at menopause			
Mean $\pm$ S.D	$48.91 \pm 3.51$	$47.86 \pm 4.14$	$48.77 \pm 5.76$
(Range)	(40-59)	(30-58)	(34-58)
Height(Cms)			
Mean $\pm$ S.D	$151.65 \pm 5.68$	$151.98 \pm 6.37$	$150.44 \pm 5.84$
(Range)	(134-169)	(131-181.1)	(131-161)
Weight(Kgs)			
Mean $\pm$ S.D	$50.6 \pm 13.2$	$62.18 \pm 10.23$	$52.4 \pm 9.58$
(Range)	(32-97)	(36-97)	(30-75)
BMI (Kg/m <sup>2</sup> )			
Mean $\pm$ S.D	$21.59 \pm 3.67$	$26.95 \pm 4.33$	$23.08 \pm 3.6$
(Range)	(14.27-32.9)	(15-40)	(16.4-30.4)

**Table 2: Details of bone mineral density of women from different socio economic strata**

	Total	Normal	Osteopenic	Osteoporotic
Rural	125	4(3.2%)	26(20.8%)	95(76%)
Urban	250	33(13.2%)	87(34.8%)	130(52%)
ULSES*	55	2(3.64%)	13(23.64%)	40(72.73%)
Total	430	39(9.07%)	126(29.30%)	265(61.63%)

\*ULSES - Urban Lower Socio Economic Strata

**Table 3: Subjects with Osteoporosis**

	Hip	Spine	Total osteoporotic
Rural	42(33.6%)	93(74.4%)	95(76%)
Urban	46(18.4%)	120(48%)	130(52%)
ULSES	17(30.9%)	38(69.1%)	40(72.73%)

## DISCUSSION:

The present study, using DXA for bone mineral density measurement estimated the prevalence of osteoporosis to be 62%. However, it was less among urban affluent post menopausal women. The urban women had more years of formal education. There was no significant difference in height or menopausal age, but there were a significant difference in the BMI, with urban affluent women having higher BMI compared to women from the lower socioeconomic strata and rural areas(26.95 vs. 21.6 and 23 Kg/m<sup>2</sup>).

A previous community based study from Haryana, to assess the prevalence of osteoporosis among postmenopausal women using lateral spine X- Rays revealed that 30% of women 55 years and older had osteoporosis. 730 women were enrolled into the study, radiological examination was done in 603 persons and radiological observations consistent with vertebral fractures were observed in 30.4% of women. The mean age of their patients was 62 years. Subjects with vertebral fractures had a higher age and were shorter in height; however, the BMI was comparable. While 23.8 % of women between 55 and 59 years had osteoporotic fractures, more than 38% of women above 65 years of age had the same. Amongst the women less than 145 cm. in height, 37% had osteoporosis, whereas, of those more than 160 cm in height only 26% had osteoporosis. Seven women in this group gave history of non- vertebral fractures, of which six were of the forearm and one was of hip fracture(11). Osteoporosis among women who had attained menarche 12 years of age or earlier was less than those who attained it later.

Both these studies indicate that osteoporosis is a serious problem among postmenopausal women in India. We also observed that osteoporosis was less among women with higher education and higher BMI. This probably means that better education (healthy lifestyle) and better nutrition may be protective against osteoporosis. This observation is supported by the findings reported by Binilli et al. (13), wherein the prevalence of osteoporosis

showed an inverse relationship with the level of education, ranging from 18.3% for the most educated to 27.8% for the least educated women.

The number of subjects who volunteered for this study from the urban slum areas was the least (55 women) followed by rural areas(125 women).The same groups also showed higher prevalence of osteoporosis as compared to the urban affluent group(250 women).This could probably be a reflection of the impact of a higher level of education and better economic conditions, allowing these women greater access to health care facilities, higher levels of self awareness and preventive health seeking behavior which further underscores the influence of education in the etiology of this disease.

We also observed that there was a significant difference in the BMI (26.95 vs. 21.6 and 23) amongst the three groups of women, and that osteoporosis was higher amongst women with lesser BMI. While a lower BMI may be appropriate for women in their 30s and 40s, gaining weight in the post menopausal age may not be necessarily counterproductive with respect to bone health. Thus a nutritionally poor diet as seen in the rural women may be possibly linked to osteoporosis in them. These findings indicate that developing nations like India, need to invest in better nutrition for women at an earlier age by widespread implementation of national health programs like the mid day meal program.

A variety of studies indicate that genetic factors are responsible for determining 50-90% of bone mass and other qualitative aspects of bone (14). While genetic factors may predict the peak bone mass reached, modifiable factors like lifestyle changes, greater physical activities, better nutritional and educational status, would go a long way in attaining better bone health and preventing fragility fractures.

## CONCLUSION:

We concluded that using DXA for bone mineral density the estimated prevalence of osteoporosis in our study population was 62%. This gains special importance in India, given the vast cultural and social economic diversity, where a complex interplay of nutritional habits, educational status and relative lack of importance of the girl child ultimately impact the health of women.

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