

Prevalence of Osteoporosis and Osteopenia among Females in Manipur, Northeastern, India: A Community-Based Cross-Sectional Study.

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ABSTRACT

Background: Osteoporosis has become a major public health problem and is increasingly being recognized as an important cause of morbidity and mortality among women. Data on prevalence of osteoporosis and osteopenia among women varies in different age groups and states across India. Objective: To determine the prevalence of osteoporosis and osteopenia among females in Manipur. **Methods:** A cross-sectional study was conducted among 2700 pre and postmenopausal women with intact ovaries in the age range of 21 to 70 years in three districts of Manipur namely Imphal West, Thoubal and Churachandpur districts. Bone mineral density (BMD) was measured by using Lunar Prodigy DXA, GE Healthcare Company, USA. Descriptive statistics like mean(SD), percentage were used. Anova and post-hoc tests were used to determine significance of the findings. A p-value of <0.05 was considered as statistically significant. **Results:** Prevalence of osteoporosis was 23.7%, 21.1%, 19% for Imphal, Thoubal and Churachandpur districts respectively. However, high prevalence of low BMD among the study population were noted; 61.9% for Imphal, 58.2% for Thoubal and 57.9% for the Churachandpur district. Statistically significant association was found between age groups 25-39 and 40-59 years with three districts and osteoporosis; age groups and osteoporosis when all districts are combined. **Conclusion:** Overall prevalence rate of osteoporosis and osteopenia was 21.3% and 36.6% respectively. Among the districts, it was highest in Imphal followed by Thoubal and Churachandpur districts, representing urban, rural and hill region.

Keywords: Prevalence, Osteoporosis, Osteopenia, Bone Mineral Density, DXA scan

INTRODUCTION

Osteoporosis has become a major global public health problem and is now considered as a silent disease which is increasingly being recognized as an important cause of morbidity and mortality among women.^[1] It is a chronic, progressive disease characterized by reduced bone mass and the disruption of bone architecture that results in increased risks of fragility and fractures.^[2] According to the WHO, up to 70% of women (>80 years of age) have osteoporosis.^[3] It is estimated that every 3 seconds one osteoporotic fracture occurs somewhere in the world.^[4] The Universal burden of the low BMD almost doubled (0.12% vs

0.21%) over the 20-year period from 1990 to 2010, and low BMD caused nearly one-third of the all fall-related deaths around the world.^[5] Osteoporosis is estimated to affect 200 millions women worldwide - approximately one-tenth of women aged 60, one-fifth of women aged 70, two-fifths of women aged 80 and two-thirds of women aged 90.^[6]

According to World Health Organization, Bone Mineral Density (BMD) is classified based on the T score of DEXA Scan wherein T score <-2.5 is considered as Osteoporosis and T score > -1 to < -2.5 as Osteopenia.^[7]

While data on prevalence of osteoporosis among women in India come from studies conducted in small groups spread across the country, estimates suggest that of the 230 million Indians expected to be over the age of 50 years in 2015, 20%, ie, ~46 million, are women with osteoporosis.^[8] 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 from developed

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countries, with a high prevalence of osteopenia (52%) and osteoporosis (29%) thought to be due to inadequate nutrition.^[9]

In view of the lack of data on the prevalence of osteoporosis in women in the north eastern region of the India, this study was undertaken to determine the prevalence of osteoporosis in Manipur by studying the women population in three districts which represent a hill, rural and urban districts.

MATERIAL AND METHODS

A cross-sectional study was conducted during 2013-2016 among 2700 pre and post-menopausal women with intact ovaries in the age range of 21 to 70 years. The study was conducted in Manipur, one of the seven states in Northeastern India. There are nine districts in Manipur, out of which, three districts namely Imphal West, Thoubal and Churachandpur districts representing urban, rural and hill regions based on the population census of the year 2001 was selected using simple random sampling. Using electoral roll 2012 as the sampling frame, first all the wards were listed based along with their population. From the list, based on the population, wards were selected randomly to meet the required sample so as to have 550 women from 21 to 45 years age group and 350 women from the 46 to 70 years age group from each district. Selection of the individual from the selected wards was done using systematic random sampling.

Pregnant women, lactating women, on steroid or other hormone replacement therapy, chronic endocrinal disorders like thyroid diseases, parathyroid diseases, adrenal diseases' etc, on active medication for osteoporosis within 6 months, women on calcium channel blocker and women with severe systemic disease(s) and those who did not give consent were excluded from the study.

Study variables include age, district and bone mineral density (T-score of the DEXA scan). Bone mineral density was measured by using Lunar Prodigy DXA, GE Healthcare Company, USA.

Lunar Prodigy DXA has mechanism to adjust radiation quality, absorption coefficient and tissue-equivalent materials using a block phantom and follows-up BMD values using a lumbar phantom.

Daily quality control measures which take around 5 minutes were performed before undertaking the measurements.

Operational definition

T score <-2.5 is considered as Osteoporosis and T score > -1 to <-2.5 as Osteopenia.^[7]

Ethical issues

The study was approved by the Institutional Ethics Committee, RIMS, Imphal and informed written consent was taken from the participants. Confidentiality was maintained.

Statistical analysis

Data were entered in MS Excel and analysed using IBM SPSS Statistics for Windows, Version 20.0.Armonk, NY: IBM Corp. Descriptive statistics like mean, standard deviation, median, percentage and percentiles etc were employed. Anova and post-hoc tests were used to determine significance of the findings. A probability value of less than 0.05 was considered as statistically significant.

RESULTS

[Table 1] showed that prevalence of osteoporosis for Imphal district is 23.7%, 21.1% in Thoubal district, 19% in Churachandpur district and overall prevalence rate was 21.3%. Prevalence of osteoporosis was increases with advance in age as from 0.9% in <25 years to 54.5% in >60 years when all the districts are combined. Similar trend was also observed in each individual district. Interestingly, prevalence of osteopenia was almost similar across the different age groups. However, high prevalence of low bone mineral density among the study population were noted; 61.9% for Imphal, 58.2% for Thoubal and 57.9% for the Churachandpur district. In the age groups 25-39 and 40-59 years, there were significant association between three districts and osteoporosis ($p < 0.000$ and $p < 0.028$). When the age groups are combined, the association between districts and osteoporosis was also significant ($p < 0.012$). When all the districts are combined, the association between age groups and osteoporosis was statistically significant ($p < 0.000$).

Table 1: Bone Mineral Density (Osteopenia and Osteoporosis based on DXA T-score as per WHO guidelines)* by age and districts

Age Group	Imphal (n=900)		Thoubal (n=900)		Churachandpur (n=900)		Combine (n=2700)	
	Osteopenia	Osteoporosis	Osteopenia	Osteoporosis	Osteopenia	Osteoporosis	Osteopenia	Osteoporosis
	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)
<25	39(36.8)	1 (0.9)	38(36.5)	2(1.9)	41(39.0)	0 (0.0)	118(37.5)	3(1.0)
25-39	126(40.6)	37(11.9)	109(3.9)	45(14.8)	99(31.5)	16(5.1)	334(36.0)	98(10.6)
40-59	124(37.2)	91(27.3)	128(38.3)	59(17.7)	121(37.3)	69(21.35)	373(37.6)	219(22.1)
>60	55(36.4)	84(55.6)	59(37.3)	84(53.2)	55(35.0)	86(54.6)	169(36.3)	254(54.5)
Overall	344(38.2)	213(23.7)	334(37.1)	190(21.1)	316(35.1)	171(19.0)	994(36.6)	574(21.3)

*Osteopenia (T score -1 to -2.5), Osteoporosis (T score -2.5>)

DISCUSSION

Prevalence rate of osteoporosis and osteopenia varies across the country which ranges from 8-62% and 26.7-69% respectively from different studies conducted in different states among different age groups in Indian women.^[8-17] In the present study, the prevalence of osteoporosis and osteopenia was found to be 21.3% and 36.6% respectively. However, in a study conducted by Borgohain B et al, 2017 in a tertiary care referral hospital in northeastern region reported 29.4% and 47.9% prevalence of osteoporosis and osteopenia respectively which was higher than our findings.^[13] This difference in prevalence rate could be because of difference in the study populations as their study was a retrospective analysis of all patients who had DXA scan on some clinical ground or perceived risk factor for osteoporosis from 2014 to 2017. Recent studies in women (aged 40 years and above) in different part of Asia found a prevalence of low BMD viz. 18% in Saudi Arabia, 49.3% in Pakistan, 50.7% in Iran.^[18-20] Regarding the prevalence of osteopenia and osteoporosis among premenopausal women, our findings were comparatively on higher side as compared to other studies in India. In a study conducted by Chhibber G et al among >60years women reported a prevalence of 62%, which was higher as compared to the current study finding of 54.5% among elderly women.^[17] Numerous studies have reported increasing prevalence of osteoporosis with advancing age as different age-groups have different prevalence rate of osteoporosis and osteopenia. Therefore, among the non-modifiable risk factors, age could be an important risk factor of osteoporosis which should not be overlooked. The most important contributing factors may be variable physical activity level as well as diminishing physiological effect due to ageing. Therefore, women need to be made aware about the importance of active and healthy ageing so as to delay the onset of osteopenia and osteoporosis and subsequently osteoporotic related fracture. In the present study, comparatively lower prevalence was observed in the Churachandpur district representing an exclusive hill district may be explained by their different lifestyle where they are mostly involved in hard manual work to earn their livelihood, adequate exposure to sunshine, long distance walking on hilly terrain due to poor transport mechanism and non-vegetarian food as their staple diet which have a positive impact on bone health, therefore, contributing to low BMD. In contrast, higher osteoporosis rate in Imphal district representing an urban district in Manipur may be due to an advanced lifestyle due to urbanization, where people are mostly having sedentary lifestyle and engaged in indoor activities, better transport leading to less walking activities,

less exposure to sunshine and consumption of fast foods which leads to overweight and obesity which are important modifiable risk factors and have a negative effect on bone health in long run. Thoubal district which represent a rural district remain in between the two extremes.

Finding of low bone mineral density (BMD) in 1568 (osteopenia – 994(34.6%), osteoporosis - 574(21.3%)) out of total 2700 subjects indicates that low BMD is prevalent in more than 60% of the study population in Manipur.

In the current study, there were significant association between the age groups 25-39 and 40-59 years and three districts and osteoporosis ($p < 0.0001$ and $p < 0.028$). Similarly, statistically significant association was observed between combined age groups and three districts and osteoporosis ($p < 0.012$).

When all the districts are combined, the association between different age groups and osteoporosis was statistically significant ($p < 0.0001$). It may be due to variable activity level in these age groups in various districts as explained before and diminishing physiological effect due to ageing. The strengths of the study is that it covered three districts of Manipur, has a large sample size, wide age range of 21years to 70 years and DXA scan was used to measured BMD which is considered as the gold standard. However, further studies should be done covering other districts, male gender and assess known risks/preventive factors.

CONCLUSION

Overall prevalence rate of osteoporosis and osteopenia in Manipur was 21.3% and 36.6% respectively. This high prevalence of low BMD among the females of Manipur are alarming as majority of these females were apparently asymptomatic and engaged in their day today activities without any precautions. Therefore, there is an urgent need for screening for BMD based on the risk profile and elderly women on routine basis so as to take up timely intervention is highly recommended, since this conditions of osteopenia and osteoporosis is a silent disease and once fractures occur, they may results in morbidity leading to disability and mortality and also a socio-economic burden to the state and nation.

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