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A Study to Find out the Prevalence for Osteoporosis and Osteopenia in Pre and Post Menopausal Women in India: A Cross Sectional Study

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Abstract: ***The awareness of osteoporosis has grown worldwide in recent years. 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 people. A cross-sectional study was conducted with the aim to screen the urban population for osteoporosis .A total number of 92 Indian pre-post menopausal women were screened for osteoporosis at New delhi during a free health check up camp on International women's day at ortho ODP using QUS bone densitometer for phalynx and radius. The study consisted of 31 pre-menopausal women in the age group of >35years and 61 post menopausal women in the age group of 36-72years.out of 92, 11(11.9%)women with osteoporosis CI 5.3% to 18.5% and prevalence rates of osteopenia in 55(59.7%) C I 49.8% to 69%. There was having thyroid problem in 25 women i.e. 27.17%. Most of the women BMI was normal 48(52.17%), overweight with 31(33.69%) and least with underweight 6(6.52%).There was no association between BMI and BMD. Further the results shows that there was no significant association between osteoporosis, osteopenia with sedentary life style, familyhistory, thyroid problem and low calcium diet.***

Keywords: pre-menopausal women, post menpausal women, BMD, Osteoporosis, Osteopenia

1. Introduction

Osteoporosis occurs when the struts which make up the mesh-like structure within bones become thin causing them to become fragile and break easily, often following a minor bump or fall. These broken bones are often referred to as fragility fractures. Although exact numbers are not available, based on available data and clinical experience, on estimated 25 million Indians may be affected, osteoporotic fractures in India occur commonly in both sexes, and many occur at a younger age in the women. Osteoporotic fractures are a major cause of morbidity and mortality in the elderly. Based on 2001 census, approximately163 million Indians are above the age of 50; this number is expected to increase to 230 million by 2015.Even conservative estimates suggest that of these, 20% of women and about 10-15% of men would be osteoporotic. The total affected population would therefore, be around 25 million. If the lower bone density is shown to confer a greater risk of fracture, as is expected, the figure can increase to 50 million. Several quantitative techniques are available for the measurement of BMD; Dual energy X-ray absorptiometry (DXA), an advanced bone densitometer is presently considered as the 'gold' standard for measuring BMD; Inindia, only corporate multi-speciality hospital has this facility, and cost for each DXA-BMD scan is high.

The ultrasound based bone densitometer called as quantitative ultrasound; QUS' is relatively cheaper and is widely available in India. About 42 years ago, Craven and co-investigators developed a method for non-invasively measuring the speed of ultrasound in cortical bone tissue in the radius and in the femur. This was extended by Fry and Barger to trabecular bone. Langton and Co-investigator developed a technique for measuring the attenuation of ultrasound in the heel and they called this method as broadband ultrasonic attenuation (BUA). Measurements are made of the frequency dependence of ultrasonic attenuation in the range 200 KHz to1 MHz. Moreover, it is one of the 'screening tool' for the disease. In India, the numbers of published research article based on QUS are very few. QUS of the radius has been shown to be more sensitive than QUS of the calcaneus when compared to a DEXA scam and has also been shown to be better predictor than clinical risk factors for women with low t-score. This method of screening will help in the early detection and treatment of osteoporosis. Although useful, QUS cannot replace DEXA, though it can be used as a cost effective tool to assess bone density in the camps for ruling out osteoporosis and osteopenia. It is well known that the life –style factors, physical activity and diet have an influence on BMD. In India, mal-nutrition is commonly seen among people. Hence, this study was carried out as there is no published normative Indian reference data on ultrasonic phalanyx and radius on estimated BMD to calculate T-score using fingers QUS parameter.

2. Review of Literature

Samar, Devmaletia et.al conducted to evaluate the prevalence of osteoporosis in South Indian urban and rural populations using portable ultrasound heel bone densitometer; A total number of 497 Indian people were screened for osteoporosis using portable heel ultrasound bone densitometer. It includes 342 urban populations, and 155 rural populations. In all the participants, the heel bone mineral density (BMD) was measured. The peak value of estimated heel BMD (g cm-2) measured in the rural young females was 0.515, whereas, in urban females, it was 0.462, It was higher in rural young females than in urban females, and was significant; The peak value of estimated heel bone mineral density, BMD (g cm-2)measured in the rural young males was 0.522, whereas, in urban males, it was 0.528, and

there was no significant difference between the two types male population; In rural females, the calculated percentage loss in estimated heel BMD (g $cm^{-2)}$ between young adult age and moderate age was found to be 17.1%, whereas in urban females, it was 8.4%; The percentage loss in estimated heel BMD between young adult age and old age were found to be 33.6% and 21.6% in rural females and urban females respectively; In rural females, the calculated percentage loss in estimated heel BMD value was greater than in urban females; In rural males, the calculated percentage loss in estimated heel BMD (g cm^{-2}) between young adult age and moderate age was found to be 8.6%, whereas, in rural males, it was 1.5%; The percentage loss in estimated heel BMD between young adult age and old age was found to be 12.1% in rural males, it was found that 10.3% and 14.3% of the rural Indian women and men respectively, aged above 50 years had osteoporosis, whereas in urban women and men, the percentage of osteoporotic were found to be 0% and 10.5% respectively.

Ethel S.Siris, et al was conducted a study to describe the occurrence of low bone mineral density (BMD) in postmenopausal women, its risk factors, and fracture incidence. A total of 200160 ambulatory postmenopausal women aged 50 years or older with no previous osteoporosis diagnosis derived from 4236 primary care practices in 34 states. Baseline BMD T scores, obtained from peripheral bone densitometry performed at the heel, finger, or forearm; risk factors for low BMD, derived from questionnaire responses; and clinical fracture rates at 12-month follow-up.The findings shows that almost half of this population had previously undetected low BMD, including 7% with osteoporosis. Peripheral BMD results were highly predictive of fracture risk.

Aim and Objectives

The aim of this study was to evaluate the prevalence of osteoporosis and osteopenia inpre and post menopausal Indian women.

Objectives

- To determine the prevalence of osteoporosis and osteopaenia in terms of BMD.
- To find out the association between the osteoporosis and osteopenia with selected variables of women.
- To find out the association between BMI and BMD of Pre and post menopausal women.

3. Materials and Method

Quantitative Research approach was used for the study. A descriptive survey design was chosen for the study. The study participants were pre-menopausal and post-menopausal women who attended the free camp at ortho ODP of selected hospital in Delhi. Sample size consisted of 92 pre and post menopausal women. Purposive sampling technique was used . Written consent was obtained from all sample subjects. Subjects with previous history of osteoporotic fracture and any chronic medications known to affect bone metabolism. i.e. diuretics, oestrogen, calcium, thiazide were excluded .BMD test, a Basic physical examination and history for each subjects were collected by interview schedule using semi structure questionnaire.

BMD test determine your risk for fractures, identify osteoporosis, osteopaenia and measure your response to osteoporosis treatment. Quantitative ultrasound (QUS) bone densitometerphalanyx and radius BMD was estimated in all the subjects using QUS bone densitometer.

T-score
World health organization definition based on bone density levels.
T score= BMD of participant - mean BMD of reference population/SD of BMD of reference population.

Level of T-score

Normal	+1and -1 SD
Low bone mass/ osteopaenia	• -1to -2.5 SD
Osteoporosis	- 2.5 SD or lower
Severe osteoporosis	• Bone density is more than 2.5 SD.

BMI calculation
Height and weight of all the participants were noted and Body mass index(BMI) was calculated using the formula= weight Kg/ $Height^2$ (m).

Category of BMI

	Underweight	Normal	Overweight	Obese
Category of BMI	< 18.5	18.5-25	25-30	>30

Statistics
The data obtained was analysed and the differences in the mean of various parameters were compared .Statistical analysis was performed using software SPSS windows.

4. Results

Table 1 shows the baseline information for the pre –post menopausal women.

Table 1: Demographics profiles of pre and post menopausal women (n=92).

Age groups (years)	*No. of women*	*No of women %*
35-45	37	40.2
46-55	21	22.9
56-65	25	27.2
66-75	9	9.7

Table 2: Distribution of Bone mineral density (BMD) among pre and post-menopausal women.(n=92)

Age groups (years)	*Total*	*%*	*Normal*	*Osteopenia*	*Osteoporosis*
35-45	37	40.2	21	16	0
46-55	21	22.9	4	16	1
56-65	25	27.2	1	22	2
66-75	9	9.7	0	1	8
			26	55	11

In women aged between 35-45yrs (n=37), 56.7 %(21/37), 43.2% (16/37 and 0% (0/37)were found to be normal, osteopenia and osteoporosis respectively. When -2.5 T-score was used as a threshold value for diagnosing osteoporosis as per WHO's classification. In women aged between 46-55

years (n=21), 19.0%(4/21), 76.1%(16/21)and 4.7%(1/21) were found to be normal, osteopenia and osteoporosis respectively, when WHO's classification was used. In women aged between 56-65years, n=25, 4%(1/25), 88%(22/25), 8%(2/25) were found to be normal, osteopenia and osteoporosis. In the aged between 66-75yrs, n=9, 0%, 11.1 %(1/9), 88.8%(8/9) were found to be normal, osteopenia and osteoporosis.

Pre –menopausal women and post –menopausal women

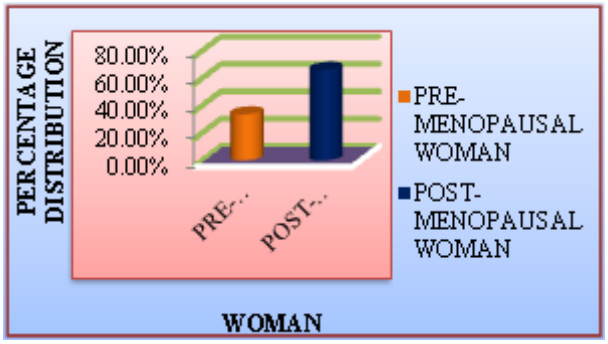

Figure 1: shows that there are 31 pre-menopausal women and 61 post –menopausal women among the subjects

Table 3: Prevalence of osteoporosis and osteopenia

Condition	*Number*	*Prevalence in % (odd ratio)*	*95% of confidence Interval*
Osteoporosis	11/92	11.9%	5.3% to 18.5%
Osteopenia	55/92	59.7%	49.8% to 69.7%

Of the 11(11.9%) persons with Osteoporosis CI 5.3% to 18.5% and prevalence rates of Osteopenia is 55(59.7%) C I 49.8%to 69%.

Table 4: Maternal history of Osteoporosis

Yes	11	11.95%
No	81	88.04%

Table 5: Thyroid problem

Yes	25	27.17%
No	67	72.82%

Table 6: Low calcium diet

Yes	44	47.82%
No	48	52.17%

Table 7: Sedentary life style

Yes	46	50%
No	46	50%

BMI

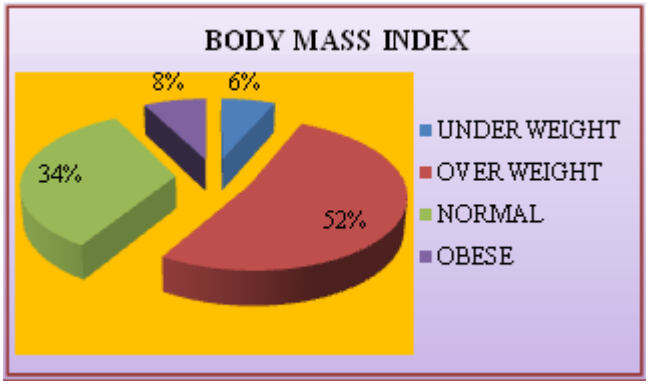

Figure 2: BMI of women

Table 8: Findings related to the association between BMI and BMD.n=92

BMI	*BMD Normal*	*Osteopaenia*	*Osteoporosis*	Fisher Exact value	P value
Underweight (<18.5)	3	6	0	6.7	0.977
Normal (18.5-25)	13	28	7		
Overweight (25-30)	8	17	3		
Obese (>30)	2	4	1		

The data in above Table 8 shows that the calculated Fisher's exact value was 6.7; the obtained p value of 0.977 was higher than 0.05 level of significance. This indicates that there is no significant association between the BMD and BMI of women.

Table 9: Findings related to the association between the osteoporosis and osteopenia with their selected variables of womenn=92

Variables	*Osteopaenia*	*Osteoporosis*	*Fisher Exact value*	*P value*
Family history				
Yes	4	2		
No	51	9	0.2	0.260
Thyroid problem				
Yes	8	1		
No	47	10	0.4	1.000
Low cacium diet				
Yes	28	7		
No	27	4	0.2	0.521

The data presented in table 9 shows that the computed fisher exact test value for association between the osteoporosis and osteopenia with their selected variables of pre and post menopausal women were not found to be statistically significant at 0.05 level

5. Discussion

Findings of the study revealed that the women aged between 35-75years (n=92) 26 (28.2%) were found to be normal, 55(59.7%) was osteopenia and 11(11, 9%) were osteoporosis. Among 92 participants, 31 pre-menopausal women and 61 were post menopausal women. Of the 11(11.9%) persons with Osteoporosis CI 5.3% to 18.5% and prevalence rates of Osteopenia is 55(59.7%) C I 49.8%to 69%.This findings were consistent with the findings of the study conducted by **Sudhasharma et al** to screen the bone status (osteopenia and osteoporosis) above the age of 25 years in urban women population in Jammu. Result showed that a substantial female population had oesteopenia and

osteoporosis after the age of 45 years. After the age of 65 years, there was an almost 100% incidence of either osteopenia or osteoporosis, indicating that it increases with age and in postmenopausal period, thereby suggesting lack of estrogenic activity might be responsible for this increasing trend. Osteoporosis was (20.25%) and osteopenia (36.79%) with maximum number of both osteoporosis and osteopenic women recorded in the age group of (55-64 years). This was also supported by another study conducted by **Neelam Agarwal et al** that Out of 200 women studied, 106 were found to have low BMD (osteopenia and osteoporosis).

Present study reveal that maximum participants does not have thyroid problem 67(72.82%) and 25(27.71%) were having thyroid problem. Among this, 44(47.82%) has low calcium diet and 48(52.17%) has not taken low calcium diet.50% had sedentary life style and 50% had not adopted sedentary life style. BMI of the women were 6(6.5%) underweight, 48(52.17%) were normal, 31(33.60%)and obese 7(7.6%) The present study indicates that there is no significant association between the BMD and BMI of women that were in contrast to the findings of study conducted by **Neelam Agarwal et al** that there was positive correlation between low BMI and low BMD. Further findings of the present study revealed that there was no significant association between the osteoporosis and osteopenia with their selected variables like Sedentary life style, Family history, Thyroid problem and Low calcium diet of pre and post menopausal women were not found to be statistically significant at 0.05 level.

6. Conclusion

The study concludes that there was prevalence of osteopenia and osteoporosis among the study samples in the aged between 35-75yrs of women in India. There was no significant association between BMI and BMD and also with selected variables with osteoporosis and osteopenia.

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