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Short Communication

Cross sectional study of osteoporosis among women

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ABSTRACT

Osteoporosis is a major public health problem, associated with substantial morbidity and socio-economic burden. An early detection can help in reducing the fracture rates and overall socio-economic burden. The present study was carried out to screen the bone status (osteopenia and osteoporosis) above the age of 35 yrs in the women. A community based cross sectional study was carried out in 158 women by calculating WHO T-scores utilizing calcaneal QUS as diagnostic tool. The prevalence of osteoporosis and osteopenia was found to be $13.3\% \pm 5.29\%$ and $48.1\% \pm 7.79\%$ respectively. Statistical association of prevalence of osteopenia and osteoporosis was found to be significant with age group; gravida status; attainment of menopause; body weight and physically active status of the women. The statistical association was not significant in relation to the rank status of their husband, as well as dietary pattern of the women but still it has to be substantiated by conducting larger community based trials in future.

The present study found that there was statistically significant relationship between age group and the prevalence of osteopenia and osteoporosis. There was a negative correlation between age of the women and BMD. Besides age, gravida status and menopausal status have negative correlation with BMD while positive correlation with physically active lifestyle. The results were found to be non-significant in relation to rank status of husband and dietary pattern.

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Introduction

Osteoporosis is a disease characterized by reduction in the bone mass and disruption of bone architecture leading to impaired skeletal strength and increased susceptibility of fractures.¹ Vertebral, hip, and other fragility fractures in women, associated with osteoporosis in later half of life find their foundation in pre- and peri-menopausal period with a variety of factors affecting the bone mineral metabolism.² These include non-modifiable factors like female sex, old age, small thin built, ethnicity and family history of fractures. Important modifiable

risk factors include calcium and vitamin D deficiency, sedentary lifestyle, smoking, excessive alcohol and caffeine intake.³ Prevention and treatment of osteoporosis consist of non-pharmacological & pharmacological measures. The benefits of the three components of non-pharmacological therapy are well established which includes diet, regular weight bearing exercises and cessation of smoking & alcohol consumption.^{3,4}

Measuring the bone mineral density (BMD) remains 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

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density however is Dual Energy X-ray Absorptiometry (DEXA), useful tool for both axial and appendicular skeleton. But the commonest used modality of measuring bone density still remains to be calcaneal QUS (Quantitative Ultra Sonography) as it is cost effective, lacks deleterious effect of radiation and is portable, and therefore it can be useful for screening of osteopenia and osteoporosis.^{5,6}

There is very little data on prevalence & incidence of osteoporosis in India.⁷ An understanding of BMD pattern in women aged above 40 yrs is crucial for prevention, diagnosis of osteoporosis and management of its complications in later life.^{8,9} Hence, the present study investigates BMD in the dependant wives of Officers and other ranks of serving personnel, above age of 35 yrs utilizing calcaneal QUS as a screening tool.

Materials & methods

A cross sectional community based descriptive study was undertaken to study prevalence of osteopenia & osteoporosis and its correlation with epidemiological and socio-behavioral factors amongst dependant women above age of 35 yrs. The study was carried out during the camp run from 14 to 16 Dec 2010 for estimation of BMD, been sponsored by Elder pharmaceuticals. Total of 194 women attended the camp and informed consent was taken from all.

Systemic diseases like renal and hepatic disorders; endocrine disorders like thyrotoxicosis, hyperpara-thyroidism, Addison's disease, Cushing syndrome; rheumatoid arthritis; prolonged immobilization and women with oophorectomy were excluded from study. Women on long-term medication affecting the bone turnover were also strictly excluded. Thus responses and results of 36 women were not included for analysis in the present study.

The questionnaire included information on socio-demographic variables, menstrual, obstetrics and medical history. The BMD was measured at calcaneus (heel) by standardized QUS utilizing T-scores based on WHO criteria,¹⁰ which were obtained from the automated equipment. T-score refers to the ratio between patient's BMD and that of young adult population of same sex and ethnicity. T-score of >-1 was taken as normal, between -1 and -2.5 osteopenic and <-2.5 as osteoporotic.

All the women attending the camp were counseled for dietary modifications as well as physically active lifestyle as first step toward prevention of falls and fractures. Those who were diagnosed to be suffering from osteopenia and osteoporosis based on T-scores underwent orthopedic evaluation at nearby Zonal Hospital for further management and follow up.

Analysis was done using the EPI INFO 2000 using standard statistical procedures. The risk factors were analyzed using Chi square test for categorical variables and unpaired t test for continuous variables. The level of significance considered is 5%.

Results

In the present study, responses and results of 158 women which included the wives of Officers ($n = 32$) and other ranks

($n = 126$) being mix of both housewives and working class. Maximum number were in age group of 35–45 yrs ($n = 108$) followed by 45–54 yrs ($n = 42$) and 55–64 yrs ($n = 8$). The mean age was $42.5 \text{ yrs} \pm 3.4$. 88% of women were multigravidae while 29.7% had attained menopause. 41.5% of the women confirmed of being involved in regular physical activity of duration more than 30 min, besides routine.

38.6% of women were normal as per WHO T score criteria, whereas $48.1\% \pm 7.79\%$ (40.31%–55.89%) had osteopenia and $13.3\% \pm 5.29\%$ (8.01%–18.59%) had osteoporosis. The mean $\pm$ SEM, T-score at calcaneum by QUS in the present study was -1.58 ± 0.44 . Among total of 21 osteoporotic women, maximum were recorded in the age group at 55–64 yrs followed by 45–54 yrs and then of 35–44 age group. While studying the age wise trend, it followed increasing trend uniformly [Table 1]. The presence of osteopenia and osteoporosis and other variables was evaluated using Chi square test for categorical variables and unpaired t test for continuous variables. Statistical association of prevalence of osteopenia and osteoporosis was found to be significant with age group; gravida status; attainment of menopause; weight and physically active status of ladies. The statistical association was not significant in relation to rank status of their husband and dietary pattern [Table 2].

Discussion

The prevalence of osteoporosis in the present study was $13.3\% \pm 5.29\%$ and osteopenia $48.1\% \pm 7.79\%$ with maximum number of both osteoporotics and osteopenic recorded in age group of 55–64 yrs and 45–54 yrs respectively. More than 80% of population above 50 yrs was either osteopenic or osteoporotic. The study found that there was statistically significant relationship between age group and the prevalence of osteopenia and osteoporosis. There was a negative correlation between age of the women and BMD. In a hospital based study among urban women above age of 25 yrs utilizing calcaneal QUS by Sharma et al¹⁰ 20.25% and 36.79% were suffering from osteoporosis and osteopenia respectively. While retrospective study using DEXA scan records of 40–60 yrs Indian women by Acharya et al⁸ documented 18.41% osteoporotic and 47% osteopenics.

Variable prevalence figures obtained in various studies are largely attributed to different study settings like difference in parent population of study samples; whether study is

Table 1 – Age wise distribution and trend of osteopenic & osteoporotic ladies.

Age group (in yrs)	Normal n (%)	Osteopenia n (%)	Osteoporosis n (%)	Total
35–44	53 (49%)	46 (42.7%)	9 (8.3%)	108
45–54	7 (16.7%)	27 (64.3%)	8 (19%)	42
55–64	1 (12.5%)	3 (37.5%)	4 (50%)	8
Total	61 (38.6%)	76 (48.1%)	21 (13.3%)	158

Note: Figures in parenthesis are row percentages.

Chi square value = 24.02.

Degree of freedom (d.f.) = 4.

p Value = 0.000.

Table 2 – Association of demographic-socio-behavioral factors with prevalence of osteopenia & osteoporosis.

Rank of husband	Normal n (%)	Osteopenia n (%)	Osteoporosis n (%)	Total
Officers	18 (56.3%)	10 (31.3%)	4 (12.4%)	32
PBORs	43 (34.2%)	66 (52.3%)	17 (13.5%)	126
Chi square value = 5.62, Degree of freedom = 2, p value = 0.062				
Gravida status	Normal n (%)	Osteopenia n (%)	Osteoporosis n (%)	Total
1	13 (68.4%)	5 (26.3%)	1 (5.3%)	19
2 or more	48 (34.5%)	71 (51.1%)	20 (14.4%)	139
Chi square value = 8.15, Degree of freedom = 2, p value = 0.016				
Menopause attained	Normal n (%)	Osteopenia n (%)	Osteoporosis n (%)	Total
Yes	3 (6.4%)	32 (68.1%)	12 (25.5%)	47
No	58 (52.3%)	44 (38%)	9 (7.7%)	111
Chi square value = 31.09, Degree of freedom = 2, p value = 0.000				
Physical activity	Normal n (%)	Osteopenia n (%)	Osteoporosis n (%)	Total
Yes	40 (61%)	21 (32%)	5 (7%)	66
No	21 (23%)	55 (60%)	16 (17%)	92
Chi square value = 23.24, Degree of freedom = 2, p value = 0.000				
Dietary	Normal n (%)	Osteopenia n (%)	Osteoporosis n (%)	Total
Vegetarian	23 (35%)	36 (54.5%)	7 (10.5%)	66
Mixed	38 (41%)	40 (43.5%)	14 (15.5%)	92
Chi square value = 2.01, Degree of freedom = 2, p value = 0.366				
Weight (in kgs)	Normal n (%)	Osteopenia n (%)	Osteoporosis n (%)	Total
<50	1(14.3%)	4 (57%)	2 (28.7%)	7
51–69	43 (52.4%)	32 (39%)	7 (8.6%)	82
>70	17 (24.6%)	40 (58%)	12 (17.4%)	69
Chi square value = 15.04, Degree of freedom = 4, p value = 0.00461				
Note: Figures in parenthesis are row percentages.				

population based or facility based or convenience based and the different techniques used in estimation of BMD. However there was universal concurrence in the available literature that as the age advances, the incidence/prevalence of osteopenia and osteoporosis (the silent disease) increases with a resultant increase in the osteoporotic fractures more so among women. This might be because there is an increased imbalance between bone resorption and formation with aging, which is an important cause of osteoporosis in elderly, especially among post-menopausal women.^{1,3}

The present study shows that besides age, gravida status and menopausal status have negative correlation with BMD while positive correlation with physically active lifestyle. These results could not be compared as these factors as a variable has not been reported in the available literature. However larger community based studies may be required to be carried out to establish such correlation.

The results were found to be non-significant in relation to rank status of husband and dietary pattern. Vegetarian was more affected population although they varied non-significantly from other dietary patterns. This may be due to deficient diet in calcium or low nutrients status.⁸ The same was documented and found to have statistically significant relationship in a randomized study among 30–60 yrs females using DEXA as measuring tool for bone mineral density.⁵

The present study has some limitations. Women screened were those who volunteered for check up during camp,

although deliberate efforts were made to ensure maximum participation in the camp by the ladies above 35 yrs present in the station. Although, use of the WHO T-score thresholds of -2.5 for osteoporosis and <-1.0 for osteopenia may be inappropriate at skeletal sites other than the spine, hip and forearm or when other modalities, such as QUS are used.⁶ QUS yields a lower incidence or prevalence of osteoporosis if this WHO T score is applied. Although studies are present suggesting QUS screening using same diagnostic criteria can at least confirm or rule out osteoporosis.^{4–6,10}

Conclusion

The present study suggests that calcaneal QUS method utilizing same WHO T score criteria is a potential screening tool because of the low cost, feasibility, portability and helps in identifying osteopenia and osteoporosis in a substantial female population who otherwise shall remain undiagnosed and face the complications of osteoporosis. Healthy lifestyle (diet, exercise and sunlight exposure) can have a major positive impact on the bone health of Indians. These public health measures are recommended for the population at large as they are efficacious, safe and cost-effective. There is thus an urgent need for greater public awareness in this regard. For the middle aged and elderly, early detection and treatment of osteoporosis with available agents can

significantly reduce the risk of fractures and associated morbidity and mortality.

Conflicts of interest

All authors have none to declare.

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