Int J Pharm Bio Sci 2016 July ; 7(3): (B) 241-245

Original Research Article Allied Science

International Journal of Pharma and Bio Sciences ISSN 0975-6299

ANALYSIS OF BONE MINERAL DENSITY AMONG RURAL AND URBAN POSTMENOPAUSAL WOMEN

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ABSTRACT

Osteoporosis is a serious public health concern due to its prevalence worldwide. It leads to increased morbidity and mortality associated with fragility fractures [1]. Since osteoporosis is often clinically silent it is imperative to make a concerted effort to identify individuals who are at risk of fracture. The aim of this study is to Analyze bone mineral density among rural and urban postmenopausal women. For this comparative study 500 postmenopausal women in the age group of 45-60 years were randomly selected from rural and urban area(250 in each group) in Tamil Nadu, India.. Rural subjects were selected from Somangalam region which is located in Kancheepuram district. Urban subjects were selected from Perambur region, Chennai. Weights and heights of patients were measured using standardized device. Bone mineral density was measured using Furuno's CM-200 light ultrasound bone densitometer at the calcaeneous. Bone mineral density values were measured in terms of quantitative ultra sound device specific T-score criteria which is similar to World health organization's criteria[2] . Bone mineral density measurements of the subjects were graded according to the T-score as normal, Osteopenia and osteoporotic.. Results were statistically analyzed using Percentile and Analysis of variance . Among rural post menopausal women 30.4% were found to be osteoporotic ,45.2% were osteopenic,24.4% had normal bone mineral density and in urban post menopausal women 24.8% had T- score value below -2.5 (osteoporotic condition),41.2% were Osteopenia and 34% had normal bone mineral density. The mean value of height and weight of urban postmenopausal women was higher than the rural postmenopausal women and was statistically significant at 0.05 level of confidence. Results concluded that prevalence of osteoporosis among postmenopausal women is greater in rural area than the urban area.

KEYWORDS ; Bone mineral density , Rural postmenopausal women ,Urban postmenopausal women, Osteoporosis

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INTRODUCTION

The World Health Organization states that throughout the world, over 200 million people experience bone mineral density loss and approximately 40% of the affected people are women at the age of 50 or over. Osteoporosis is defined as a progressive systemic skeletal disease characterized by low bone mass and micro architectural deterioration of bone tissue with a consequent increase in bone fragility and susceptibility to fracture. Fractures produce significant mortality and morbidity, as well as tremendous economic burden for our health care system [3]. Postmenopausal women after the age of 55 are liable to suffer from Osteoporosis and even bone fractures because of insufficient nutrients, physical exercise ,endocrine secretions , sunshine etc. which lead to drop in calcium absorption and hasten the decrease in calcium content of the bone . Osteoporosis is greatly under diagnosed and undertreated in Asia ,and is acute particularly in rural areas. Bone mineral density test measures the density of minerals present in the bones using a special scan. . Quantitative ultrasound measurement could be an ideal tool to screen for osteoporosis at the community level [4].This study was conducted to analyze the Bone mineral density among postmenopausal women in rural and urban area of Tamilnadu.

MATERIALS AND METHODS

For this Comparative study free medical camps for women where organized in both the rural and urban areas on Saturdays and Sundays for a period of one month in each area. Rural area selected for the study was Somangalam Village in Kunnattur Taluk in Kancheepuram District of Tamil Nadu State, India. Urban area selected for the study was Perambur , a locality in the northern region of the metropolitan city of Chennai in Tamilnadu state. About 398 women in rural area and 431 women in urban area attended the camp, among them 500 postmenopausal women age between 45-60 years were selected from rural and urban area (250 from each group) by random sampling method. Cross sectional research design was adopted for this study. The research variables included bone mineral density, height and weight of rural and urban postmenopausal women .Inclusion criteria for the sample selection comprises of postmenopausal women age between 45-60 years. With the brief introduction of the study, informed consent was obtained from all the study participants. Speed-of-sound measurements at the calcaeneous can identify persons at risk of osteoporotic fracture as reliably as bone mineral density measurements and could be an ideal tool to screen for osteoporosis at the community level [5].Bone mineral density (BMD) was measured in calcaeneous (heel bone) using Furuno's CM-200 light ultrasound bone densitometer. BMD values were measured in terms of quantitative ultra sound device specific T-score criteria which is similar to WHO's criteria[2]**.** T- score is the number of standard deviation relative to the standard speed of sound value of the young age group. Normal is a T-score of −1.0 or higher. Osteopenia is defined as between −1.0 and −2.5 . Osteoporosis is defined as −2.5 or lower. A single technician performed all QUS measurement to minimize subjective error. Weights and heights of patients were measured without shoes in light indoor clothing by the use of well calibrated digital weight and height scale measuring device.

RESULTS

The results of this study showed that educational status in urban postmenopausal women was better than rural subjects. The rural postmenopausal women educational status was less so their nutritional status also reflected negatively. Physical activity level was also low among rural postmenopausal women than urban subjects. The results of the variables were statistically analyzed using Percentile and Analysis of variance .Data analysis and results of bone mineral density ,height and weight are tabulated below.

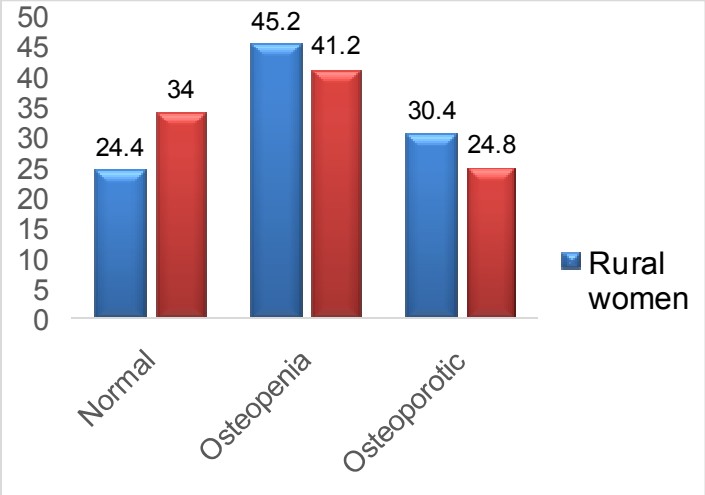
Table 1

Percentage distribution of Bone mineral density measurement between rural and urban Postmenopausal women (Scores in percentage)

S.No	Bone mineral density measurement (T score)	Rural women		Urban women	
		Number	Percentage	Number	Percentage
1	(Up to -1) Normal	61	24.4	85	34
2	(Between -1.1 to -2.5) Osteopenia	113	45.2	103	41.2
3	(Below-2.5) Osteoporotic	76	30.4	62	24.8

The above table shows the values of bone mineral density in T –Score. In rural area 113 (45.2%)post menopausal women had T-score value between -1.1 to –2.5 (Osteopenia condition) ,61 (24.4%) respondents had T-score value up to -1(normal condition) and 76 (30.4%) post menopausal women had T-score value below -2.5 (osteoporotic condition) . In urban area 103(41.2%) post menopausal women had T-score value between -1.1 to -2.5(Osteopenia condition), 85(34%) post menopausal women had T-score value up to -1(normal condition) and 62(24.8%) post menopausal women had T-score value below -2.5 (osteoporotic condition). The results shows that Osteopenia and osteoporosis were comparatively more prevalent among rural post menopausal women than urban post menopausal women. The mean values of rural and urban postmenopausal women on bone mineral density are graphically presented

Graph 1
Bar Diagram Showing the Mean Value of Bone mineral density (Scores in Kg/m^2)



Height: The height of respondents were measured in centimetres. Table II shows the results of height among rural and urban groups.

Table 2
Computation of Analysis of Variance on Height among Rural and Urban Postmenopausal women(Scores in Centimeters)

Mean Value		Square of variance(SV)	Degree of freedom(DF)	Sum of Squares(SS)	Mean squares(MS)	Obtained F value(OF)
Rural	Urban					
148.88	152.86	Between	1	1972.5	1972.5	**55.359***
		Within	498	17744	35.631	

** The table value required for significance at 0.05 level of confidence with degree of freedom 1 and 498 is 3.86.*

The mean value of height was 148.8 for the rural postmenopausal women and 152.8 for the urban postmenopausal women. The obtained 'F' ratio of 55.3 was higher than the table 'F' ratio of 3.86. Hence height was significant at 0.05 level of confidence for the degrees of freedom 1and 498 between the rural and urban groups. The mean value of height of urban postmenopausal women was greater than the rural postmenopausal women and was statistically significant.

Weight: Table III shows the results of weight among rural and urban groups.

Table 3
Computation of Analysis of Variance on Weight among Rural and Urban Postmenopausal women (Scores in Kilograms)

Mean Value		Square of variance(SV)	Degree of freedom(DF)	Sum of Squares(SS)	Mean squares(MS)	Obtained F value(OF)
Rural	Urban					
57.34	62.16	Between	1	2897.8	2897.8	**71.339***
		Within	498	20229	40.62	

**The table value required for significance at 0.05 level of confidence with degree of freedom 1and 498 is 3.86.*

The mean value of weight was 57.3 and 62.1 for rural and urban subjects respectively. The obtained 'F' ratio 71.3 w as higher than the table 'F' ratio 3.86.Hence weight was significant at 0.05 level of confidence for the degrees of freedom 1and 498 between the two groups. The mean value of weight of urban postmenopausal women was greater than the rural postmenopausal women and was statistically significant.

DISCUSSION

Various studies have shown that effective screening of an at –risk population can result in decreased incidence of fracture [6].In this comparative study on analysis of bone mineral density among rural and urban post menopausal women, osteoporosis and Osteopenia were more common in rural post menopausal women than the urban post menopausal women. The findings of the study is in line with the findings of the study done by Gomez-de-Tejada Romero, et al[7] stated that postmenopausal women who live in rural populations have lower Bone mineral density and a higher prevalence of vertebral fractures and of osteoporosis. The mean height of rural women is significantly lower than urban post menopausal women and osteoporosis is also more prevalent in rural subjects than urban subjects. The findings of the study is in line with the findings of the study done by Sheth stated that short women are at a greater risk since they have less total bone mass. Thin women are at a greater risk since adipose tissue is a source of estrone , a an estrogen that retards bone loss. The findings of the study is consistent with Pongchaiyakul C et al [8] comparing bone mineral density (BMD) between rural and urban populations in Thailand, femoral neck BMD was found to be higher in males and females living in rural areas compared with urban dwellers from Bangkok, while little difference was observed at the lumbar spine. Hamid Arazi.[9] et al investigated the relationship of anthropometric characteristics such as height, weight to bone mineral density in postmenopausal women and concluded that anthropometric indices such as height weight are important determinants of BMD and risk of osteoporosis in postmenopausal women. Rural postmenopausal women have lower stature, lower educational level and their calcium intake was also less so the prevalence of osteoporosis among postmenopausal women in the rural areas was higher. Low stature are predictors of low speed of sound. Studies shows that the prevalence of osteoporosis among postmenopausal women in the rural areas was higher due to a lower stature[10]. Lopez- Caudana AE.[11] et al study also observed better BMD in taller postmenopausal women than shorter subjects and concluded that greater height is also a determinant of BMD in postmenopausal women. As per the results observed in this study mean height and weight of rural postmenopausal women were comparatively less than urban samples so this may be the reason for low bone mineral density among rural samples. These associations were also demonstrated in previous studies[12].

CONCLUSION

Bone mineral density correlates highly with fracture risk and allows the clinician to determine the need for pharmacological intervention[13]. The results of the present study about analysis of bone mineral density among rural and urban postmenopausal women concluded that osteoporosis and Osteopenia condition were more prevalent among rural subjects than urban subjects. Rural post menopausal women were less in height and weight compared to urban subjects. The mean value of height and weight of urban postmenopausal women was higher than the rural postmenopausal women and was statistically significant at 0.05 level of confidence. Results concluded that rural postmenopausal women have low bone mineral density than the urban postmenopausal women. Menopausal age, educational status, nutrient intake, anthropometric parameters, physical activity also influence bone mineral density. So further studies can be done in order to design an appropriate intervention strategy to find the reason why low bone mineral density is prevalent among rural postmenopausal women than urban subjects.

CONFLICT OF INTEREST

The authors have no conflict of interest to declare.

ACKNOWLEDGEMENT

I would like to thank the paramedical staffs and trained assistants for their help. Sincere gratitude to all the subjects for their participation and co-operation.

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