Pallavi Singh
Research Scholar,
Department of Food Nutrition
and Public Health, Ethelind
Collage of Home Science, Sam
Higginbottom University of
Agriculture, Technology and
Sciences, Allahabad,
Uttar Pradesh, India

Virginia Paul
Professor, Department of Food
Nutrition and Public Health,
Ethelind Collage of Home
Science, Sam Higginbottom
University of Agriculture,
Technology and Sciences,
Allahabad, Uttar Pradesh, India

A cross-sectional study of osteoporosis among pre and post-menopausal women of Allahabad district

Pallavi Singh and Virginia Paul

Abstract

Osteoporosis a "Silent Disorder" as mostly people may not know that they have osteoporosis until their bones become so weak that a sudden strain, fall or bump causes a hip fracture or collapsed vertebra. Thus for the purpose of prevention and control of osteoporosis there is great interest in conducting epidemiologic survey on prevalence of osteoporosis and related risk factors in communities. The present study was carried out to determine the bone status (Osteopenia and Osteoporosis) of pre and post-menopausal women of Allahabad district aged between 35-65 years. A community based cross-sectional study was carried out among 316 women by calculating WHO T-score by utilizing P-DEXA machine as diagnostic tool. The prevalence of osteopenia and osteoporosis was found to be 46.20 percent and 26.58 percent respectively. Statistical interpretation of the data shows that prevalence of osteoporosis and osteopenia was found to be significant with educational status, annual family income and physically active status of the women. The statistical association was not significant with the occupation, parity as well as dietary pattern of the respondents but still it has to be validated by conducting large community based survey in future.

Keywords: Hip fracture, osteoporosis, osteopenia, P-DEXA

Introduction

Osteoporosis is a bone disease characterized by reduced bone density, deficiency of bone tissue relative to the volume of biological bone and decreased bone strength. Since osteoporosis is a "Silent Disorder", as generally people may not be aware of their diseased condition until they experience fragility fracture after a sudden strain on bones, bumps or falls due to their weaken bones [1].

Occupation of the respondents may be associated with the occurrence of the low bone mineral density due to the absence of proper nutrition. The association of occupation with the prevalence of osteoporosis is still not well documented but some studies showed a negative impact of occupation on the osteoporosis prevention health programs [2]. Similarly the documented data on the relation of educational level of the population with the prevalence of osteoporosis said that there was a difference in the prevalence of osteoporosis among different educational classes and it was recommended that improved formal education may reduce the prevalence of osteoporosis among the vulnerable population [3].

Pregnancy, multi-parity and prolonged lactation are suggested as factors modifying negatively in the development of osteoporosis. But the contrary data from some studies shows that increased parity protects women from osteoporosis and the severity of the disease [4]. While some studies concluded that low socio-economic status associated with high prevalence of osteoporosis and osteoporotic fractures may be due to the absence of proper nutrition [5].

Among the behavioral risk factors of the osteoporosis, it was documented in some studies that that physical activity and fitness reduces the risk of osteoporosis and fractures and fall related injuries [6]. Higher level of leisure time, sports activity, household chores and fewer hours of sitting daily were significantly associated with reduced risk of osteoporosis and related fractures [7]. On the other hand general health status may be influenced by the general dietary quality and dietary pattern. The various studies suggested a healthy and balanced dietary meal pattern for the prevention of osteoporosis especially among the women [8].

Osteoporosis is not life-threatening; the quantitative data are scarce from developing countries like India.

Correspondence
Pallavi Singh
Research Scholar,
Department of Food Nutrition
and Public Health, Ethelind
Collage of Home Science, Sam
Higginbottom University of
Agriculture, Technology and
Sciences, Allahabad,
Uttar Pradesh, India

Thus for the purpose of prevention and control of osteoporosis there is great interest in conducting epidemiologic survey on prevalence of osteoporosis and related risk factors in communities. For the prevention, diagnosis of osteoporosis and management of it's complications, it is necessary to understand the pattern of the BMD mainly among the pre and post-menopausal women aged above 40. Hence the present study explores BMD in the pre and post-menopausal women of Allahabad district aged between 35-65 years by utilizing P-DEXA scan as a screening tool.

Materials and Methods

This study was a community based cross-sectional study with descriptive and analytical components among pre and post-menopausal women of Allahabad District. This study was undertaken to determine the prevalence of osteoporosis and osteopenia among the selected respondents and its association with the socio-behavioral factors of the selected women aged between 35-65 years. This study was carried out in one specialized hospital named Yashlok Hospital and Research Centre, which provides advanced health services to the community regarding bone health. The screening for Bone Mineral Density (BMD) was carried out using P-DEXA scan machine, by a technician, in the presence of a radiologist. The free BMD check-up camps were considered as the platform for screening the subjects from different urban areas of Allahabad District. On the whole, eight camps were attended to obtain adequate number of subject.

Pregnant women, chronically debilitated patients (with any know or unknown diseases), those with known diseases that affect bone metabolism (diabetes, hypertension, cancer, kidney diseases, etc.), and severely deformed patients (Kyphosis, anomalies of the anterior arm, etc.) were excluded from the study. The total number of women covered in the study was 316 (Three Hundred sixteen only).

The questionnaire includes the information regarding the socio-behavioral factors of the respondents like occupation, education, number of parity, annual family income, dietary pattern and physical activity status. The BMD was measured at calcaneus (heel) by P-DEXA scan utilizing T-score based on WHO criteria which were obtained from an 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 for further management and follow up. The analysis for the risk factors was done by using chi-square test and the level of significance considered is 5%.

Results

In the present study, responses and results of 316 women which includes the pre-menopausal women (n=138) and post-menopausal women (n=178). Majority of them belongs to the age group of 35-44 years (n=114) followed by 45-54 years (n=108) and 55-64 years (n=94).

27.22 percent women were normal as per WHO T-Score criteria whereas 56.20 percent had osteopenia and 26.58 percent had osteoporosis. Among total 84 osteoporotic women, majority were belongs to the age group of 55-64 years (n= 42) followed by 45-54 years (n=35) and 35-44 years (n=7). While analyzing age wise trend, it followed increasing trend uniformly. (Table.1) The presence of osteopenia and osteoporosis among the selected respondents and other variables was calculated by using chi-square test to determine the association between them. Statistical association of prevalence of osteopenia and osteoporosis was found to be significant with educational status, annual family income and physical activity status of the selected respondents. The statistical association was not significant in relation with number of parity, occupation and dietary pattern of the women. (Table. 2)

Table 1: Age Wise Distribution of Osteopenic and Osteoporotic Women

S. No	Age of the Respondents	Osteopenic		Osteoporotic		Normal		Total	
		n	%	n	%	n	%	N	%
1.	35-44 Years	62	42.46	7	8.33	46	53.48	114	36.08
2.	45-54 Years	48	32.87	35	41.66	24	27.90	108	34.18
3.	55-64 Years	36	24.65	42	50	16	18.60	94	29.74
	Total	146	100	84	100	86	100	316	100
	χ (cal) = 45.46 χ(tab)= 9.48 d.f. = 4				S* (At 5% level of Significance) *Significant					

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

S. No	Occupational Status	Osteopenic		Osteoporotic		Normal		Total	
		n	%	n	%	n	%	N	%
1.	Professionals	48	32.88	25	29.76	29	33.72	102	32.28
2.	Self Employed	18	12.33	12	14.29	11	12.79	38	12.03
3.	Home Maker	80	54.79	47	55.95	46	53.49	176	55.69
	Total	146	100	84	100	86	100	316	100
	χ (cal) = 0.44 χ(tab)= 9.48 d.f. = 4				NS** (At 5% level of Significance)					

S. No.	Educational Status	Osteopenic		Osteoporotic		Normal		Total	
		N	%	n	%	n	%	n	%
1.	Illiterate	25	17.12	8	9.52	10	11.63	43	13.60
2.	High School	29	19.86	18	21.43	19	22.09	64	20.26
3.	Intermediate	13	8.90	32	38.1	16	18.60	61	19.30
4.	Graduate	47	32.2	16	19.1	25	29.07	90	28.48

S. No.		n	%	n	%	n	%	N	%
5.	Post-Graduate	32	21.92	10	11.90	16	18.69	58	18.36
	Total	146	100	84	100	86	100	316	100

χ (cal) = 32.60   χ(tab)= 15.05   d.f. = 8   S* (At 5% level of Significance)

S. No.	No. of Parity	Osteopenic		Osteoporotic		Normal		Total	
		n	%	n	%	n	%	N	%
1.	0-3	112	76.71	62	73.81	65	75.58	239	75.63
2.	4-6	32	21.92	21	25	18	20.93	71	22.48
3.	Above 6	2	1.37	1	1.19	3	3.49	6	1.89
	Total	146	100	84	100	86	100	316	100

χ (cal) = 1.99   χ(tab)= 9.48   d.f. = 4   NS** (At 5% level of Significance)

S. No.	Annual Income	Osteopenic		Osteoporotic		Normal		Total	
		n	%	n	%	n	%	N	%
1.	Middle Class	13	8.90	47	55.95	23	26.74	83	26.26
2.	Upper Middle Class	78	53.43	29	34.52	29	33.73	136	43.04
3.	High Class	55	37.67	8	9.52	34	39.53	97	30.69
	Total	146	100	84	100	86	100	316	100

χ (cal) = 68.52   χ(tab)= 9.48   d.f. = 4   S* (At 5% level of Significance)

S. No.	Physical Exercise	Osteopenic		Osteoporotic		Normal		Total	
		n	%	n	%	n	%	N	%
1.	Walking	52	36	26	31	42	49	120	38
2.	Yoga	28	19	13	15	18	21	59	19
3.	No Exercise	66	45	45	54	26	30	137	43
	Total	146	100	84	100	86	100	316	100

χ (cal) = 10.24   χ(tab)= 9.48   d.f. = 4   S* (At 5% level of Significance)

S. No.	Type of Diet	Osteopenic		Osteoporotic		Normal		Total	
		n	%	n	%	n	%	N	%
1.	Vegetarian	53	36	38	45	23	27	114	36
2.	Non- Vegetarian	46	32	27	32	34	39	107	34
3.	Eggitarian	47	32	19	23	29	34	95	30
	Total	146	100	84	100	86	100	316	100

χ (cal) = 7.31   χ(tab)= 9.48   d.f. = 4   NS** (At 5% level of Significance)

NS** Non-Significant   S* Significant

Discussion

The prevalence of osteoporosis in the present study was 26.58% and osteopenia 46.20% with maximum number of both osteoporotic and osteopenic recorded in age group of 55–64 years and 45–54 years respectively. More than 80% of population above 50 years 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. Similar report was observed in Indian women who showed that maximum number of cases of both osteopenia and osteoporosis were recorded in age group of 55-64 years and 45-54 years respectively [9]. Another similar report was observed among the Indian women over the age of 50, in which age dependent decline in BMD was seen, screened through digital X-ray radiogrammetry [10].

In this study occupational status was not significantly associated with the prevalence of osteoporosis and similar findings among the urban Iranian post-menopausal women were also reported, in which the data shows that occupation is an independent factor for the occurrence of osteoporosis [11]. The contrary data was reported among the rural and urban women of Vietnam that skeletal status (Osteoporosis) was significantly associated with life-long occupation [12]. The documented data on the relation of educational level of the population with the prevalence of osteoporosis showed a positive association of educational level and prevalence of osteoporosis among the post-menopausal women of Iran [13]. A study which was conducted among the Chinese post-menopausal women showed that higher level of education is independently associated with better BMD and lower prevalence of osteoporosis [14].

This study shows a negative association between the number of parity and the prevalence of osteoporosis among the selected respondents. This data is supported by a similar study, conducted among the Spanish postmenopausal women in whom it was observed that parity is not associated with low bone mineral density and it was also documented that as the number of parity increased, the age also increased and age is well known risk factor for the higher prevalence of osteoporosis. So it could be stated that parity is not directly linked with prevalence of osteoporosis [15]. Various studies have been documented in relation with socio-economic status and greater need for healthcare, health outcomes and health inequities. Poverty and low socio-economic status has been shown to be a definite risk factor for osteoporotic fractures in a study performed in Spain [16].

Physical activity and fitness reduces the risk of osteoporosis and fractures and fall related injuries [17]. Studies have shown that bone mineral density in post-menopausal women can be maintained or increased with therapeutic exercise [18]. The food that we eat can affect our bones. Type of diet which is rich in nutritional content like calcium and vitamin D shows a positive effect on the bone health but nutritional content of food taken in any type of diet is associated with the BMD irrespective of type of diet [19].

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

Conclusion

The present study suggest that pre and post-menopausal women should go through the DEXA screening of the BMD for early detection of loss of bone mineral density and adopt healthy dietary pattern and appropriate lifestyle modifications to reduce this loss. It is the need of the hour for the health care personnel to organize nutrition education programmes and dietary counseling which is a promising intervention to increase calcium intake and promote physical activity. It is recommended to create awareness about the risk factors of the osteoporosis as well as the preventive and curative measures related with the management of osteoporosis.

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