Original Research Article

Management of osteoporosis in women - A prevalence and interventional study

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International Archives of Integrated Medicine, Vol. 3, Issue 4, April, 2016.

Available online at http://iaimjournal.com/
ISSN: 2394-0026 (P) **ISSN: 2394-0034 (O)**
Received on: 25-03-2016 **Accepted on:** 07-04-2016
Source of support: Nil **Conflict of interest:** None declared.
How to cite this article: Sridevi A, Ragi V. Management of osteoporosis in women - A prevalence and interventional study. IAIM, 2016; 3(4): 140-145.

Abstract

Background: In modern era, Osteoporosis is become a major public health problem, associated with substantial morbidity and socio-economic burden. Osteoporosis is a disorder having the characteristic features of low bone mass and structural degeneration, promoting the development of brittleness of the bones. An early detection can help in reducing the fracture rates and overall socio-economic burden.

Aim: To find out the prevalence of osteoporosis and the associated risk factors and to find out the impact of intervention on osteoporosis with reference to education, diet supplement and yoga.

Materials and methods: A total 940 members were selected for prevalence study, among them 92 subjects were selected for the intervention study. All subjects were divided in to four groups and parameters used to manage osteoporosis were education, diet and yoga.

Results: The prevalence of osteopenia was 26% and osteoporosis 14% along with 60% of normal among women. As the age increased the prevalence of osteoporosis also increased. The prevalence of osteopenia and osteoporosis (low BMD) was found to be high (73%) among women in the age group of 51-60 years compared with that of 41- 50 years (27%). improvement of knowledge in all the groups, physical performance in the EDY and EDDY group.

Conclusion: The assessment of risk factors related to low bone density revealed that age, educational status, menopause, duration of menopause, height (short) and exercise of women were significantly associated with low bone mineral density resulting in osteopenia or osteoporosis.

Key words

Osteoporosis, Osteopenia, Menopause, Diet, Yoga.

Introduction

In modern era non-communicable diseases are rapidly increasing in developing countries including India [1]. 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, which typically involves wrist, spine and hip [2]. Osteoporosis is a global public health problem currently affecting more than 200 million people worldwide. Several studies on osteoporosis stated that women have higher chances of developing osteoporosis. This is due to fact that women have lower peak bone mass and smaller bones than men. They also lose bone mineral density more rapidly than men in middle age because of the dramatic reduction in estrogen levels that occurs with menopause [3].

Population based studies in India show prevalence of osteoporosis in male as 3% and female as 8% ICMR report [4]. In urban areas 48% of osteoporosis occurs in the lumbar spine and 17 % in the femoral neck Paul (2008) [5]. When compared to the West, Indians have a lower average peak bone mass especially among women is observed. This is attributable to poor awareness of the role of food requirement with reference to calcium and vitamin D, particularly for the desirable bone mass density.

There is very little data on prevalence and incidence of osteoporosis in India [4]. An understanding of BMD pattern in women aged above 40 years is crucial for prevention, diagnosis of osteoporosis and management of its complications in later life [5, 6]. Thus, there is a need to create awareness among the women to prevent and manage the disease. Therefore the present study is conducted to evaluate the prevalence and management of osteoporosis in women with special reference to diet and yoga. This process is expected to create awareness, delay the onset of the disease and mange to stop further deterioration by improving the quality of life.

Material and methods

The present study was conducted in department of Obstetrics and Gynecology in association with Orthopaedics, MNR Medical College and Hospital, Sangareddy. A total 940 members were selected for prevalence study, among them 92 patients were selected for intervention study and subjects were divided in to four groups with equal representation. Women between 41-60 years were selected for the prevalence study. However, women between 21-40 years and above 60 years of age were also included for screening on request. Thus the women aged between 21- 80 years were included for the study. Only volunteers who expressed their willingness to participate in the intervention study were selected. Consent from these volunteers was obtained through Informed Consent Form (ICF). The ethical clearance was obtained from Institutional Ethics Committee, MNR Medical College and Hospital.

The screening for Bone Mineral Density (BMD) was carried out using Quantitative Ultrasound (QUS), was considered as the platform for screening the subjects. The present study was conducted over a period of 24 months to obtain adequate number of subjects 940. All patient details were obtained by standard questionnaire. The major objective of the study was to find out the impact of intervention program. To study the impact the following parameters were tested before and after intervention, the BMI, BMD (DEXA), biochemical parameters, knowledge, physical performance, 24 hour dietary recall, Frequency of Food Consumption (FFC) and quality of life. All the date was computerized and results were interpreted by chi-square test and student t-test.

Results

According to the study, the majority (39%) of the subjects were in the age group of 41-50 years, followed by 31-40 years (27%) and 51-60 years

(23%). A lower percentage (6 %) was in the age group of 21-30 years, followed by 61 years and above (5%). Higher percentage (72%) of the women was gainfully employed and only 28% were home makers.

Majority of women (53%) had attained menarche between 12 and 14 years followed by 24% of women in the age group of 14 to 16 years and 21% of women attained menarche at age <12 years High percentage (93%) of the subjects had regular menstrual cycle, whereas only 7% of the respondents had amenorrhea.

Screening using Quantitative Ultra Sound (QUS) method on the bone mineral density based on the t score results indicated that 60% were normal and 40% had low bone mineral density. It is very evident from the study as age increased the prevalence of osteoporosis also increased i.e. 21-40 years (4%), 41- 60 years (10%) and > 60 years (63%). 54% of women had Low BMD leading to osteopenia and osteoporosis in the age group of 41-60 years. Low bone mineral density and diseases status was as per **Table – 1**. Low bone mineral density related to food habits and intake of calcium supplements was as per **Table – 2**.

Table – 1: Low bone mineral density (LMBD) and diseases.

Disorders	**BMD status**					
	Normal		**Osteopenia**		**Osteoporosis**	
	Number	**%**	**Number**	**%**	**Number**	**%**
Rheumatoid arthritis	32	63	15	29	4	8
Bronchial asthma	12	50	11	49	1	1

Table – 2: Food habits and intake of calcium supplements.

Parameters	**Normal**		**Osteopenia**		**Osteoporosis**		**Chi-square (p-value)**	**Relative risk (CI)**
	No	**%**	**No**	**%**	**No**	**%**		
Vegetarians	162	50	160	51	34	47	0.299	1
Mixed diet	161	50	155	49	38	53	0.861	(0.8-1.6)
Supplementation of Ca and Vitamin D	247	76	244	78	53	73	0.785	0.9
No Supplementation of Ca and Vitamin D	77	24	71	22	20	27	0.675	(0.7-1.2)

The results of this study was noted that osteoporosis prevalence was found to be high (73%) among women aged between 51-60 years compared with women aged between 41-50 years (27%). The prevalence of osteoporosis is highly significant ($p<0.01$) as the age increases. The relative risk (RR) of developing osteoporosis was 1 to 2.4 times more as age increases years from 46-60 years compared to 41-45 years. Education was highly significant ($p<0.01$) i.e. lower the educational level higher the incidence of osteoporosis.

The management of osteoporosis needs an integrated approach. Hence, the intervention was carried out with 3 different approaches. Four groups were formulated as stated in the methodology namely Group I - ED (Education), Group II – EDD (Education and Diet), Group III – EDY (Education and Yoga) and Group IV – EDDY (Education, Diet and Yoga).

The physical performance of the EDY and EDDY group has significantly improved ($p<0.01$) in their physical performance whereas the ED and EDD group has not shown

improvement in the performance. The improvement in the EDY and EDDY group performance might be contributed to the yoga.

The consequence of osteoporosis is fracture. The risk of fracture is studied with the help of the prediction of the radiologist from the BMD measurements from the reports furnished. McNamara's test was used to find the risk of fracture in future. In general the fracture risk prediction depicts a positive observation in EDY, ED, EDD and EDDY group.

Discussion

In comparison, a study from Thai reported that the prevalence of osteoporosis in the lumbar spine of Thai post-menopausal women aged 50 to 54 years and 55 to 59 years, was 9.4% and 22.6%, respectively [7]. Our estimations of prevalence of osteoporosis were similar (14%) when compared with other studies from different countries 15.8% in Tehran [8], 11.6% in Japan, Iki [9], 18% in Iran Sharami [10].

The study from Rotterdam reveals that in females, age contributed 7.1%, while the age related decline in bone density contributed only 1.9%, in males values were similar. These results correlates with the present study where relative risk (RR) increased with age [11]. A study by Suzanne concluded that women who had low education qualification had 1.9% more prone to develop osteoporosis than highly educated women [12]. A study from Iran found women under the absolute poverty lines had the lowest mean BMD values ($p < 0.0001$). The higher the education levels lower the incidence of osteoporosis [13]. In the present study education was highly significant i.e. lower the educational level higher the incidence of osteoporosis.

Life style is one of the modifiable risk factors which could be considered in the prevention and management of osteoporosis. Food habits are not showing much impact on osteoporosis. Kanis JA, et al. [14] in his study found that women who have a petite structure (low height) are prone to osteoporotic risk fractures. The same result was seen in the present study. The study by Veena Shatrugna, et al. [15] highlighted the problem of poor bone health of Indian low-income group women engaged in repetitive work. Load-bearing activities were not associated with better bone health probably due to the absence of adequate nutrition.

Sakondhavat, et al. [16] have stated that the prevalence of osteoporosis increases proportionally with advancing age and duration of menopause in the lumbar vertebrae as well as the femoral neck. Zhai, et al. [17] reported that with increasing age a significant loss of bone mass occurs in the vertebrae and femoral neck of postmenopausal women, the relationship between loss of bone mass and age not being linear, but quadratic. In contrast, Liu-Ambrose, et al. [18] found no relationship between loss of bone mass and age. Finkelstein, et al. [19] showed that the decline in BMD occurs significantly in late perimenopause and is extremely rapid in the first postmenopausal year. Li, et al. [20] also found a significant decrease in BMD occurring with increasing age and duration of menopause.

Conclusion

In general, the present study revealed that, the low bone mineral density prevailed was 26% osteopenia, leading to osteoporosis 14% were observed. The prevalence of low bone mineral density was among 54% of the women of 41-60 years. The findings also revealed that age, menopause, duration of menopause, exercise, standing and working for long hours were considered as risk factors as they were associated with low bone mass density. Apart from the factors mentioned the education and monthly income of the family also had impact on the BMD. Lower the education and income the higher the incidence of osteoporosis among the women. Instead of taking pharmaceutical drugs food supplemented with required nutrients (here calcium and vitamin D3) could help to overcome osteoporosis. The calcium is best observed when

taken along with foods. Not only diet supplement, even the physical exercises important for bone health. The physical exercise taken here was in the form of yoga. Yoga is a very ancient method of controlling mind, body and soul. In yoga both the bone and muscle mass are coordinated. Yoga practiced continuously helps to relax the muscles. The said interventions are easy to follow and cost effective.

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