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Evaluation of Osteoporosis and Osteopenia in Elderly People in Hyderabad Region

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Abstract **Original Research Article**

The aim of this study is to evaluate the incidence of osteoporosis, evaluation of BMD, T-Score, associated serum biochemical factors &socio economic factors in 40 years above men &women. This is a cross sectional study conducted at Princess Esra hospital, Deccan College of medical sciences, Department of orthopedics, after taking informed consent from patients and after obtaining hospital ethics committee permission. In these study 100 patients both males and females above 40 yrs of age presenting with various conditions of non-autoimmune musculoskeletal pains were included in the study. In this study Calcaneal Quantitative Ultrasound (QUS) device used to examine the BMD and the *T*-score threshold at lumbar spine and femoral neck. In our study, 30% of patients were suffering with osteoporosis and 25% with osteopenia. In males 13% & 10% were suffering with osteoporosis and osteopenia respectively. In females 17% & 15% were suffering with osteoporosis and osteopenia respectively. The BMD and T-scores in males at lumbar spine (1.12±0.14 and -0.7±0.9) and femoral neck (0.93±0.2 and -0.7±0.2), in females at lumbar spine (1.08±0.12and -0.9±1.2) and femoral neck (0.93±0.2 and -1.0±1.1) are comparatively equal. The serum alkaline posphotase, Total cholesterol, uric acid, vitamin D, Calcium also influence the osteoporosis. The socioeconomic factors like occupation, education and physical activity also influence the osteoporosis and osteopenia.

Keywords: Osteoporosis, Osteopenia, Bone mineral density, T-score, factors.

INTRODUCTION

Osteoporosis is defined as a progressive, systemic, skeletal disease characterized by low bone mass and micro-architectural deterioration of bone tissues with a consequent increase in bone fragility and susceptibility to fracture [1]. Worldwide, it is estimated that 1 in 3 women above the age of 50 will experience osteoporotic fractures, as well as 1 in 5 men [2]. Osteoporosis poses one of the major health problems associated with significant morbidity, mortality and socioeconomic burden. Based on available data and clinical experience, an estimated 50 million Indians may be affected, as reported by Malhotra *et al*. [3].

WHO has defined osteoporosis as Bone Mineral Density 2.5 SD (standard deviation) below the mean bone mass of young normal adults. Normal BMD is T-score ≥-1; Osteopenia –T- score between -1 and -2.5, Osteoporosis – Tscore ≥- 2.5; severe osteoporosis – T-score≥ - 2.5 with fractures [4]. An age-dependent decline in Bone Mineral Density (BMD) was seen in both women and men over the age of 50 years and the normative database for BMD in Indian population using digital X-ray radiogrammetry was stated by Pande *et al*. [5].

An understanding of BMD pattern in a population is crucial for prevention, diagnosis of osteoporosis and management of its complications in later life. So, this study evaluate the incidence of osteoporosis, evaluation of BMD,T-Score, associated serum biochemical factors &socio economic factors in 40 years above men &women.

MATERIALS & METHODS

This is a cross sectional study conducted at Princess Esra hospital, Deccan College of medical sciences, Department of orthopedics, after taking informed consent from patients and after obtaining hospital ethics committee permission. In these study

100 patients both males and females above 40 yrs of age presenting with various conditions of non-autoimmune musculoskeletal pains were included in the study. Patients who had diseases of kidney & liver, chronic malabsorptive conditions, CNS disorders were excluded.

In this study Calcaneal Quantitative Ultrasound (QUS) device used to examine the BMD and the *T*-score threshold that would be appropriate to identify people at risk of osteoporosis using QUS. Bone status analysis was done using World Health Organization classification based on T score: normal BMD (T score≥−1), osteopenia (T score< _1 and >_2.5) and osteoporosis (T score-≥-2.5). This classification is used in this study. Each participant completed a structured questionnaire on socio demographic and lifestyle factors such as educational status, occupation, and monthly income. Additionally, in women, data on reproductive factors menopausal status, years since menopause and hysterectomy status were also collected.

The serum biochemical factors like Alkaline phosphotase, Total cholesterol, HDL, LDL, uric acid, phosphorus, calcium and 25 Hydroxy-vitamin D were analysed. Results were analysed using SPSS 16 version. Paired t- test, chisquare tests were used to analyse the data.

RESULTS

In these study 100 patients both males and females above 40 yrs of age presenting with various conditions of non-autoimmune musculoskeletal pains were included. The demographc data of patients was shown in table 1. Out of 100 patients osteoporosis was observed in 30% and osteopenia was observed in 25% people. The age wise incidence and gender wise incidence was shown in table 2&3. In this study more number of females included because of symptoms like pain, fractures. When compared to males female were obese, most of them were not doing any exercise.

Table-1: Demographic data

Mean age in years	**55.34±10.23**
Mean Weight in Kgs	60.23±5.32
BMI	28.23±3.45
Males	38
Females	62

Table-2: Age wise incidence

Age	**Number**	**Osteoporosis**	**Osteopenia**	**Normal**
40-50	22	7	3	12
50-60	38	11	8	19
60-70	25	6	7	12
70-80	11	4	5	2
Above	4	2	2	0
Total	100	30	25	45

Age was negative correlated with osteoporosis in men & women, as age increases problem also increased in all cases. In female menopause influence the bone pathogenesis, sudden decrease in the bone density was noted.

Table-3: Gender wise incidence

	Number	**Osteoporosis**	**osteopenia**	
Male	38	13	10	15
Femle	62	17	15	30
Total	100	30	25	45

The bone mineral density and T-score in both female and men were shown in the table 4. The BMD &T-scores were done at two place lumbar spine and left femur neck regions. No significant differences were seen in BMD between men and women at two sites. This indicates males were suffering as equal to females.

Table-4: BMD &T-scores in osteoporosis and osteopenia

	Female	**Male**
Lumbar spine		
BMD (g/cm^2)	1.08±0.12	1.12±0.14
T-score	-0.9±1.2	-0.7±0.9
Femur neck		
BMD(g/cm^2)	0.92±0.8	0.93±0.2
T-score	-1.0±1.1	-0.7±0.2

Table- 5: Biochemical analysis

	Females	Males
Alkaline phosphatase, mg/d	73.5±15.28	64.5±10.2
Total cholesterol, mg/dL	175.2±28.8	178.2±32.5
HDL, mg/dL	42.3±7.8	34.2±10.23
LDL, mg/dL	112.3±29.4	122.3±38.5
Uric acid, mg/dL	4.7±0.98	5.8±1.3
Phosphorus, mg/dL	3.6±0.4	3.4±0.5
Calcium, mg/dL	10.2±0.72	9.5±0.82
25 Hydroxy-vitamin D, ng/dL	25.8±10.2	24.2±0.81

Table-6: Factors effecting osteoporosis and osteopenia

	Factors	Percentage
1	Occupation	
	House hold	34%
	Working	66%
2	Physical activity(Exercise)	
	Yes	24%
	No	72%
3	Education	
	Yes	77%
	no	23%
4	Exposure to sunlight	
	Yes	64%
	No	36%
5	Musculo skeletetal disorder	
	Yes	89%
	No	11%
6.	Thyroid disorders	
	Yes	58%
	No	42%
7	Low calcium diet	
	Yes	54%
	no	46%
8	Post menopause	77%
9	Hysterectomy in females	37%

In female the mean menopause age was 45.3±2.3 years. About 37% of female undergone hysterectomy due to some gynaecological problems so early menopause was noticed in these women and all them suffering with osteoporosis.

DISCUSSION

Studies have shown that bone loss starts from the age of 30–40 years in both men and women. In women, it has been postulated that menopause is followed by an immediate decrease in bone mass and density within a year. This increased rate of bone loss reaches equilibrium approximately 10 years after menopause and then merges into a continuous age-related loss [6].

In our study 30%, of patients were suffering with osteoporosis and 25% with osteopenia. A study in Delhi estimated the prevalence of osteoporosis as 24.6% in men and 42.5%in women above 50 years of age [7]. Another study by Sharma *et al*. has reported a prevalence of 8.5% in the femoral neck region in men [8]. In kadam *et al*. [9] study overall prevalence of osteopenia at LS or hip, in both men (39%–56%) and women (36%–71%). The findings reported in Chinese men (34%–55%) and women (42%–55%) respectively [10]. Other Indian studies by Shetty *et al*.[11] and Marwaha *et al*. [12] have also reported high prevalence of osteopenia in Indian men and women.

Singh *et al*. also screened the BMD in 43patients less than 50 years old, and showed the low BMD in 65% of cases. Prevalence of osteopenia was 48.5% and osteoporosis was 16.3% without separating the lumbar from femoral BMD [13]. In a study, all CD patients were also less than 50 years old, 39% of patients had normal BMD, and 61% of newly diagnosed CD cases had low BMD [14].

In our study BMD and Tscore were measured at two sites like lumbar spine and left femoral neck

regions. In males 13% & 10% were suffering with osteoporosis and osteopenia respectively. In females 17% & 15% were suffering with osteoporosis and osteopenia respectively. These results were in accordance with Marwaha *et al*. [12] who reported an overall prevalence of 42.5% osteoporosis in women above 50 years of age at any of the three sites studied (LS, FN, and forearm).

Studies indicate that osteoporosis and osteopenia or low bone mass may occur at a relatively younger age in Indian population [15]. Studyin Iranian women above 45 years reported a prevalence of 50.7% at the LS [11] while another study by Ejaz *et al*. suggests a higher prevalence of osteoporosis in Pakistani postmenopausal women (49.3%) [12]. The high prevalence of osteoporosis in these populations maybe attributable to the high prevalence of Vitamin D deficiency found in them [16, 17].

In a study Poor sunlight exposure, skin pigmentation and a vitamin D deficient diet are some obvious causes for osteoporosis [3]. In another study in males 20% osteoporosis and 58% osteopenia rates were due to deficiency of vitamin D, hypogonadism and lack of exercise [11].

A study in 158 females (mean age, 42.5 years) reported osteoporosis and osteopenia rates as 13.3% and 48.1% respectively. Increasing age of the women, higher gravida status and menopausal status, low body weight and lesser physically active status were identified as risk factor [18]. Unni *et al*. stated lower socioeconomic status, calcium intake as main risk factors. [19]. Kadam *et al*. [9]Vitamin D deficiency, increasing age, low weight, menopause, low intakes of calcium, poor sunlight exposure were documented risk factors .

In Kadam *et al*. [9] study, in apparently healthy Indian men and women above 40 years, they observed a high prevalence of osteoporosis in postmenopausal women at the LS and a high prevalence of osteopenia in both men and premenopausal women at LS and hip. Women experience marked increase in bone loss during perimenopause and postmenopause, in men, a small longitudinal bone loss is observed throughout life. Thus, women in addition to age related bone loss also experience menopausal bone loss [7]. These results were inconformity with our results.

The serum biochemical parameters like uric acid was positively correlated with BMD [20], Total ALP was negatively associated with BMD in our study. Total ALP provides a good impression of the extent of new bone formation and osteoblast activity [21]. The changes in BMD with age have been reported to be associated with many factors including race, heredity, environment, region, lifestyle, nutrition, etc. and significant differences in BMD between peer age groups of different sexes have also been reported [22].

This study concludes that osteoporosis and osteopaenia affects the male and females at 40 years age and increase with age. More no of women are affected than males. An understanding of BMD pattern in a population is crucial for prevention, diagnosis of osteoporosis and management of its complications in later life.

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