Bone mineral density of patients attending a clinic in Dubai

Freshteh Hosseini Dana[1], Faisal Al-shammari[1], Asma'uSadiq[1], Maryam Nurudeen Abdurahman[1], Golshid Lotfizadeh[1*], Shatha Al-Sharbatti[2], Rizwana B Shaikh[2], Faheem Ahmed Khan[2]
[1]M.B.B.S. Students, College of Medicine, [2]Department of Community Medicine, Gulf Medical University, Ajman, UAE

*Presenting Author

ABSTRACT

Objectives: The study was conducted to assess the frequency of osteoporosis and to test factors that can have relationship with BMD.

Materials and Methods: A cross sectional study was done during the period from October 2011 to February 2012. Adults (age >20 years) who attended an osteoporosis clinic in Dubai were included in the study. A validated pilot-tested questionnaire was used as a tool for data collection. The questionnaire included statements on history of chronic diseases, and participants' habits related to smoking, exercise, and intake of calcium supplementation,in addition to demographic data. Bone Mineral Density (BMD) had been assessed at the left proximal femur using dual energy x-ray absorptiometery (DXA).The results of DEXA were taken from the participants' records and included in the analysis. WHO criteria were used to classify patients into normal BMD, osteoporosis and osteopenia. Analysis was performed with the use of SPSS software version 19, and Chi-square was done to test the association between variables. p values < 0.05 were considered significant.

Results: Of the 135 participants, 54.8% (n=74) were males and 45.2% (n=61) were females. The frequency of normal BMD, osteopenia and osteoporosis was 37.8%, 43.7%, and18.5% respectively. The frequency of osteoporosis among age groups <50 years, 50-59 years, and ≥ 60 years were 2.6%, 12.7% and 57.7% respectively. Osteoporosis was more common among females (21.3%) than among males (16.2%), and among smokers (35.7%) than non-smokers (14%). A lower frequency of osteoporosis was noticed among patients taking calcium supplements or doing exercise compared to those who were not having these life styles (10.8% vs 27.9%) and (8.8% vs 25.3%) respectively. A significant association was found between BMD and age (<0.001), history of renal diseases (<0.001), history of calcium supplement intake (p< 0.001), exercise habit (p< 0.05), and smoking habit (p< 009).

Conclusion: The frequency of osteoporosis was 18.5%, and it was most common among the older age (≥ 60 years) participants (57.7%). Bone Mineral Density (BMD) was significantly associated with age (p< 0.001), history of calcium supplement intake (p< 0.001), exercise habit (p< 0.05), smoking habit (p< 0.01) and history of renal diseases (p< 0.001).

Key words: bone mineral density, osteoporosis, Osteopenia

INTRODUCTION

Globally, it is estimated that one in three women and one in twelve men aged >50 years will suffer from osteoporosis in their lifetime, which is roughly equivalent to three million individuals[1]. In the developing countries, osteoporosis is an important public health problem due to the demographic transition and aging population coupled with limited resources[2].

Bone Mineral Density (BMD) is the amount of bone mass per unit volume (volumetric density), or per unit area (areal density), and both can be measured by densitometric techniques[3]. A wide variety of techniques is available to assess BMD. Dual-energy X-ray absorptiometry (DXA) is the most widely used bone densitometric technique. Other techniques include quantitative ultrasound (QUS), quantitative computed tomography (QCT), both applied to the appendicular skeleton and to the spine,peripheral DXA, digital X-ray radiogrammetry, radiographic absorptiometry, and other radiographic techniques[4,5].

Bone Mineral Density, is often viewed as the "gold standard" for assessing bone health[6]. World Health Organization

(WHO) criteria define osteoporosis as BMD T-score of 2.5 standard deviations (SD) or more below the young adult mean value (T score ≤ -2.5) and osteopenia as a BMD T-score that lies between -1 and -2.5[7]. Considerable changes in skeletal mass occur during the life cycle. Adult bone health is predominantly determined by three key factors: the maximum attainment of peak bone mass, which is achieved during growth and early adulthood; maintaining bone mass in adulthood; reducing the rate of bone loss with advancing age, with the menopausal years being a time of considerable concern for women[8]. Both peak bone mass attainment in the younger population and the rate of bone loss in post-menopausal women and the elderly are determined by key endogenous and exogenous factors, i.e. a combination of genetic, endocrine, mechanical and nutritional factors[9].

MATERIALS AND METHODS

A cross sectional study was done during the period from October 2011 to February 2012. The study was conducted with adults above the age of 20 years, who were attending an osteoporosis clinic in Dubai during period of the study. Pregnant women were excluded. Non-probability sampling method was used in recruiting the participants. A validated pilot-tested questionnaire was used as a tool in this study. The questionnaire included statements on history of chronic diseases and participant's habits related to smoking, exercise, and intake of calcium supplementation, in addition to demographic data. Bone Mineral Density (BMD) had been assessed at the left proximal femur using dual energy x-ray absorptiometry (DEXA). Results of DEXA technique were taken from the participants records and included in the analysis. The WHO criteria were used to classify patients as having normal BMD, Osteopenia or Osteoporosis. Analysis was performed with the use of SPSS software version 19, and Chi-square was done to test the association between variables. p values < 0.05 were considered significant.

RESULTS

Out of the 135 participants, 74 (54.8%) were males and 61 (45.2%) were females. Table 1 shows age distribution of the participants. Most of the participants (71.9%) aged > 50 years. As regard nationality, the participants had most frequently UAE nationality (59.3%, n=80), followed by other Arabs nationalities (35.6%, n=48), and other nationalities (5.2%, 7). Figure 1 shows the distribution of participant by Bone Mineral Density (BMD) level. It can be seen that the frequency of normal BMD, osteopenia and osteoporosis were 37.8%, 43.7%, and 18.5% respectively

Table 1. Age distribution of the participants

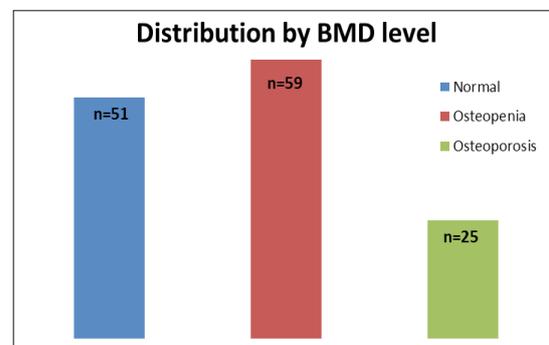| Age (years)	No.	%
<40	2	1.5
40-49	36	26.7
50-59	71	52.6
60 above	26	19.3
Total	135	100

Figure1. Distribution of participant by Bone Mineral Density (BMD) level

Table 2. Shows distribution of participants by age and BMD levels. Osteoporosis is more common among older age participants. The frequency of osteoporosis among age groups <50Y, 50-59Y, and ≥60 Y were 2.6%, 12.7% and 57.7% respectively. Highly significant association was found between age and BMD levels.

Table 2. Distribution of participants by age and BMD levels

Age (Years)	BMD levels			Total	p value
	Normal N (%)	Osteopenia N (%)	Osteoporosis N (%)		
< 50	14(38.8)	23(60.5)	1(2.6)	38	<0.001
50-50	31(43.7)	31((43.7)	9(12.7)	71	
≥ 60	6(23.1)	5(19.2)	15(57.7)	26	

Table 3. Distribution of participants by gender and BMD levels

Gender	BMD levels			Total	p value
	Normal N (%)	Osteopenia N(%)	Osteoporosis N (%)		
Males	33(44.6)	29(39.2)	12(16.2)	74	NS
Females	18(29.5)	30(49.2)	13(21.3)	61	
Total	51(37.8)	59(43.7)	25(18.5)	135	

Table 4. Distribution of participant by BMD levels and history of chronic diseases

Chronic Diseases	BMD levels			Total	P valve
	Normal N (%)	Osteopenia N (%)	Osteoporosis N (%)		
Hypertension					
Yes	58	15 (25.9)	20(34.5)	23 (39.0)	NS
No	77	10 (13.0)	39 (50.6)	18 (36.4)	
Heart disease					
Yes	10	3(30.0)	2 (20.0)	5(50.0)	NS
No	123	46(17.9)	55(44.7)	46 (37.4)	
Diabetes Mellitus					
Yes	65	17(26.2)	28(43.0)	20(30.8)	NS
No	68	8(11.8)	29(42.0)	31(45.6)	
Renal disease					
Yes	57	16(28.1)	33(57.9)	8(14.0)	<0.001
No	78	9 (11.5)	26(33.3)	43(55.1)	

Table 5. Distribution of participant by BMD levels and life style factors (calcium supplementation intake, smoking and exercise)

Life style factors		BMD levels			Total (100.0%)	p value
		Normal N (%)	Osteopenia N (%)	Osteoporosis N (%)		
Ca Suppl.(n=135)	Yes	39(52.7)	27(36.5)	8(10.8)	74	<0.001
	No	12(19.7)	32(52.5)	17(27.9)	61	
Smoking(n=135)	Yes	5(17.9)	13(46.4)	10(35.7)	28	<0.001
	No	46(43.0)	46(43.0)	15(14.0)	107	
Exercise(n=132)	Yes	25(43.9)	27(47.4)	5 (8.8)	57	≤0.05
	No	26(34.7)	30(40.0)	19(25.3)	75	

Table 3 shows the distribution of participants by gender and BMD levels. Osteoporosis was more common among females (21.3% vs 16.2%). No significant association was found between gender and bone density (p>0.05).

Table 4 shows the distribution of participants by BMD levels and history of chronic diseases. Osteopenia and osteoporosis were the most commonly found among patients with history of renal diseases. Renal diseases had a significant relationship with BMD level.

Table 5 shows distribution of participants by BMD levels and life style factors (calcium supplementation intake, smoking and exercise). It can be seen that osteoporosis is less common among participants who were taking calcium supplementation and who were non-smokers. A highly significant association between bone density and calcium supplementation intake and smoking was found. These was marginal significance between bone density and exercise practice.

DISCUSSION

This study was carried out to determine the bone mineral density among the adults above 20 years of age attending a clinic in Dubai. The study showed that osteoporosis is more common among older age participants, and that the frequency of osteoporosis among age groups <50, 50-59, and ≥60 were 2.6%, 12.7% and 57.7% respectively. This is in agreement with another study in Thailand[10] which showed that the percentages of osteoporosis at femoral neck in the age group 40 to 49, 50 to 59, 60 to 69, and > or =70 years were 6.2%, 7.4%, 24.4%, and 51.8% respectively. With regard to gender, osteoporosis was found to be more common among females compared with males and this is in accordance with WHO report which showed osteoporosis is three times more common in women than in men, partly because women have a lower peak bone mass and partly because of the hormonal changes that occur at the menopause[11]. The significant association observed in the current study between BMD and history of renal diseases confirm the results of a study done in Poland in which the BMD was used as predictor of outcome in peritoneal dialysis (PD) patients[12]. The current data showed that life style factors (intake of calcium supplement, smoking and exercise) have significant association with BMD, and this finding is in line with those in many studies. The beneficial effect of exercise on bone mass has been reported before in a study from Finland[13] in which physical activity was associated with increased BMD in a 7-year follow-up with 142 adolescent girls. A recent study from the UK[14] that included 723 healthy male military recruits, showed that smoking habit was associated with low BMD [p<0.0001] and bone microarchitecture, QUS characteristics [p≤0.0005] (calcaneal quantitative ultrasound, QUS). A randomized controlled trial in Japan[14] showed that low-dose calcium supplement of 500 mg/d can effectively slow lumbar spine bone loss in peri- and postmenopausal women with habitually low-calcium intake, but its effect on the femoral neck is less certain. Evidence supports the use of calcium, or calcium in combination with vitamin D supplementation, in the preventive treatment of osteoporosis in people aged 50 years or older[15].

CONCLUSION

The frequency of osteoporosis was 18.5%, and it was most common among older age (≥60 years) participants (57.7%). Bone Mineral Density (BMD) was significantly associated age (p<0.001), history of calcium supplement intake (p<0.001), exercise habit (p<0.05), smoking habit (p<009) and history of renal diseases (p< 0.001).

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