BONE MINERAL DENSITY MEASUREMENT IN A MEDICAL CAMP TO IDENTIFY OSTEOPENIC AND OSTEOPOROTIC SUBJECTS

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ABSTRACT

Objective: To identify osteopenic and osteoporotic subjects through bone mineral density measurement.

Design: An observational, cross sectional study, carried out in a relatively affluent community, both below and above 40 years of age, in both sexes.

Settings: In a medical camp held under the supervision of the medical specialists.

Main outcome measures: Bone Mineral Density (BMD) was assessed on all the subjects by SAHARA ultrasound bone densitometer on right calcaneus.

Results: Sixty subjects were studied, out of these 35(58.3%) were females and 25(41.7%) were males. The age range was 16 - 80 years with the mean of 46.95±18.61. Out of sixty subjects 17 were below 40 years and 43 were above the age of 40. Daily milk intake was in the range of 25-750 ml/day with the mean of 166.82±137.10. Symptoms of difficulty in getting up from floor, bone pains, cramps, body aches and pains were more prominent amongst subjects above the age of 40 years. BMD, in males below 40 years was in the Range of -3.20 ± 2.80 with the mean of 0.125±1.66 and in females was in the Range of -2.80 ±2.00, with the mean of 0.266±1.34. In subjects above 40 years, amongst males it was in the Range of -3.00 ±3.00, and mean of -0.1720±1.532 and females in the Range of -3.50 ±1.70 with the mean -0.8057±1.364. In subjects understudy 30/60 (50%) had normal BMD, 20/60 (33.4%) were osteopenic and 10/60 (16.6%) were osteoporotic. In patients over 40 years of age 29/43(67.44%) were either osteopenic or osteoporotic.

Conclusion: BMD is a simple noninvasive but expensive tool which can help in identifying osteopenic and osteoporotic subjects in both genders. It is expected that the problem is much more in the poor and malnourished community. Early detection of potential and at risk individuals and their timely and appropriate treatment can reduce the stresses of mental, physical and financial nature. Strategies need to be developed to encourage modifications of all risk factors for osteoporosis early in life.

KEY WORDS: Bone mineral Density(BMD), osteopenia, osteoporosis

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INTRODUCTION

World Health Organization (WHO) defines osteoporosis as a bone density more than 2.5 standard deviations (SDs) below the young adult mean value (T score <-2.5). Values between 1-2.5 SDs below the young adult is "Osteopenia"[1].

Bone mass changes with age, in a healthy adult it is at peak at 30 years of age, then there is gradual decline in men, whereas in women accelerated loss occurs in 10 years following menopause. It is a fact that bone mass depends

on peak mass attained and then how fast it is lost in later life. Many factors play their role while attaining peak bone mass like genetics, Vitamin D receptors, oestrogen receptors, nutritional status, sex hormones and physical activity[2]. Besides these certain exogenous factors play their role i.e. hypogonadism in both sexes, glucocorticoid treatment, low body mass index and smoking. Immobilization, excess alcohol intake, Vit. D and calcium deficiency are other important factors which are particularly relevant in elderly[3]. Hyperparathyroidism, hyperthyroidism, inflammatory bowel disease, joint diseases, chronic liver disease (CLD), chronic renal failure (CRF) also increase the risk of osteoporosis[4]. Poor lighting, neuromuscular and cardiovascular disease and commonly prescribed drugs like diuretics, antiepileptics, sedatives, anxiolytics also contribute towards osteoporosis specially in elderly people[5].

Radiographs are valuable in the diagnosis and assessment of bone structure, suspected fractures and bone deformities, but they have limited value in detection of early osteoporosis. Bone mineral density (BMD) estimated by measurements are invaluable for assessment of patients with suspected osteoporosis[4]. BMD is measured by dual energy X-ray absorpiometry technique (DXA) because of its sensitivity, precision and low radiation dose. Routinely BMD readings are taken from spine, hip and femur and assessment is made. Then the results are calculated in relation to reference ranges[6]. Bone Mineral Density (BMD) generally correlates with bone strength. By measuring BMD, it is possible to predict fracture risk in the same manner that measuring blood pressure can help predict the risk of stroke. It is also measured to monitor the effectiveness of treatment. The objective of this study was to identify osteopenic and osteoporotic subjects among those attending a medical camp.

SUBJECTS AND METHODS

This study was carried out in a free camp held under the supervision of medical specialists. This camp was held in a relatively affluent area. Publicity of the camp was carried out through handbills and displaying the banners for 02 weeks. Sixty people reported in the specified time, which comprised of both sexes. A standard proforma was filled by a house officer and an undergraduate student and subjects were later subjected to BMD assessment. BMD (gm/cm^2) of right calcaneus was assessed in all participants by SAHARA ultrasound bone densitometer, which measures the transmission of high frequency sound waves through heel. From the measured signal, three ultrasound parameters are simultaneously determined speed of sound (SOS), broadband ultrasound attenuation (BUA) and quantitative ultrasound index (QUI). The SAHARA system software estimates BMD from QUI and compares with that of young, healthy, sex matched subjects to produce T-score. The data was later analyzed and "t" test applied.

RESULTS

Sixty subjects were studied. This included 35(58.3%) females and 25(41.7%) were males. The age of the patients, details about height and weight as well as daily milk intake are mentioned in Table-I. Symptoms of difficulty

Table-I: Age height, weight & daily milk intake

	No.	*Percentage*	*Mean*
Age			
< 40 years of age	Male = 08	47.1	
	Female = 09	52.9	
	17	**100**	
> 40 years of age	Male = 17	39.5	
	Female = 26	60.5	
	43	**100**	
Overall =	Male = 25	41.7	
16-80 year	Female = 35	58.3	
	60	**100**	46.95 ± 18.61
Height			
125-182 cms			160.94±10.81
Weight			
35-105 kg.			69.61±13.59
Daily milk intake			
25-750 ml/day			166.82±137.10

in getting up from floor, bone pains, cramps, body aches and pains were more prominent amongst subjects above the age of 40 years. BMD, in males below 40 years was in the Range of -3.20±2.80 mean 0.125±166 and females was in the Range of -2·80 ±2·000, mean 0.266±1.34. In subjects above 40 years, amongst males in the Range of -3.00 ±3.00, mean -0.1720-+1.532 and females in the Range of -3.50 ±1.700 with the mean -0.8057±1.364). In subjects understudy 30/60 (50%) had normal BMD, 20/60 (33.4%) were osteopenic and 10/60 (16.6%) were osteoporotic. In subjects over 40 years of age 29/43(67.44%) were either osteopenic or osteoporotic. Out of 22/29 had osteopenia and out of these 8/22 were males,14/22 were females whereas 7/29 were osteoporotic and out of these 2/7 were males and 5/7 were females.

DISCUSSION

Bone is normally mineralized, but at a certain time mineralization is deficient in quantity and quality, so the structural changes in bones take place. This change can start from childhood when there are certain metabolic changes or systemic diseases, but generally it is noted at the age of 35-40 years[2]. This change is extrapolated after 10 years of menopause[3]. In the present study females had a lower mean BMD as compared to males but it is not statistically different. When it was compared between two groups below the age of 40 years, it was thought not significant (p=0.838) but surely BMD was lower in female subjects despite the fact that they belonged to affluent families. One of the reasons was thought to be repeated pregnancies and lactation. Similarly it was not a significant difference in both genders above the age of 40 years (p=0.060). This is an important observation which means that bone loss is also present amongst males, though relatively less than females. Those women who are osteopenic at the time of menopause attain osteoporosis earlier than those who carry well mineralized bones. In United Arab Emirates similar study was carried out which noted that local natives had a slightly lower BMD than women from United States, Caucasian and China[7]. In males one of the possibilities of lower BMD could be systemic diseases, smoking, intake of drugs, bowel diseases and immobilization. It can also be due to less intake of calcium and excessive alcohol intake. The male subjects understudy were well to do and was well exposed to sunlight. About 25% males on enquiry told that they suffer from lactose intolerance; similarly eating habits vary from person to person and from family to family.

Recently Najib U et al from Lahore[8] studied only postmenopausal women where modified version of fracture index risk assessment tool devised by Black et al[9] was used. It can be used as an alternative tool but where one can get BMD estimates done in older people and high risk subjects, this tool is an appropriate help in preventing fractures which are common in elderly people like Colle's fracture, fracture neck of femur and vertebral crush fractures[10,11]. Another study by National Osteoporosis Foundation[12] which recommends BMD after the age of 65 years, regardless of risk factors support our point of view. In our circumstances we

Table-II: Bone Density (n = 60)

1) Bone Density in less than 40 years of age (n = 17)

Male = 0.125 ± 1.660 (Range -3.20 – +2.80)
Female = 0.266 ± 1.134 (Range -2.80 – +2.00)
(P = 0.838)

2) Bone Density in more than 40 years of age (n = 43)

Male = -0.1720 ± 1.553 (Range -3.00 – +3.00)
Female = -0.8057 ± 1.443 (Range -3.00 – 1.700)
(P = 0.060)

Table-III: Symptoms

Symptoms	*< 40 years n = 17*	*> 40 years n=43*
Difficulty in getting up	2 (11.8%)	18 (41.9%)
Bone pains	3 (17.6%)	18 (41.9%)
Cramps	4 (23.5%)	19 (44.2%)
Body aches and pains	5 (29.4%)	27 (62.8%)

have to see that how much our public is aware about this menace and how many come to doctors for minor complaints. Still majority seek help of lady health visitors, dispensers or Jirrahs (local bone healers) when they encounter bone problems.

Although for diagnosis of osteoporosis, it is important to be aware of the fact that BMD is not same throughout the skeleton[13] specially in young. In the present study 10/60 were osteoporotic so one could guide them of complications and possibly treat them or try to remove the precipitating factors. 20/60 patients were osteopenic, they were both male and females and all except one were over the age of 40 years. This is a situation where we can simply help them in improving the minelrisation of bone. In younger patients if BMD measured from one site can mislead whereas in older patients it can be measured from one skeletal site[6]. In the present study it was measured from right heel as with the study of "Osteoporotic Fractures" which favours that BMD and other risk factors were predictive of osteoporotic hip fractures in Caucasian women[14,15].

BMD study is simple, non-invasive, reliable but expensive tool for screening of osteoporosis in both genders In the present study we could pick up both osteopenic and osteoporotic subjects and could suggest them appropriate measures in the hope to prevent fractures. This can help in reducing stresses of physical, mental and financial nature.

CONCLUSION

BMD is a simple noninvasive but expensive tool which can help in picking up osteopenic and osteoporotic subjects in both genders. It is expected that the problem is much more in the poor and malnourished community. Early detection of potential and at risk individuals and their timely and appropriate treatment can reduce the stresses of mental, physical and financial nature. Strategies need to be developed to encourage modifications of all risk factors for osteoporosis early in life.

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