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Original Research Article

Assessment of Osteoporotic Fractures of Distal End of the Radius in Post-Menopausal Women by Using Dexa Scan

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Abstract

Background: Fractures of the distal radius are extremely common. The present study was conducted to evaluate osteoporotic fractures distal end of the radius in post-menopausal women by using dexa scan.

Materials & Methods: All the patients between 45 to75 year age group postmenopausal women of attending Orthopaedics department with fracture distal end of radius were included. All the patients would undergo height and weight measurement, noted about status of last menstrual period, amount of physical activity, activities causing joint pain. Then bone mineral density measured by using DEXA scan and compared according to WHO definition of osteoporosis

Results: Among 100 osteoporotic women, 23% having joint pain while walking on the surface, 46% while walking upstairs, 21% while walking up hills and 10% having no pains. 34% of women do physical activity for less than 20 min, 37% women do for 20-40 min, 13% do for 40-60 min and 16% do it for more than 60 min/day. In 45-50 yrs age group, minimum bone mineral density is 0.415 and maximum bone mineral density is 0.615 with mean BMD of 0.526 with standard deviation of 0.0746. In 51-56 yrs age group, minimum BMD is 0.343 and maximum BMD is 0.515 with mean BMD of 0.435 with standard deviation of 0.0425. In 57-62 yrs age group, minimum BMD of 0.263 and maximum BMD of 0.467 with mean BMD of 0.348 with standard deviation of 0.0583. In 63-68 yrs age group, minimum BMD is 0.263 and maximum BMD is 0.452 with mean BMD is 0.332 with standard deviation of 0.0491. In age group 69-75 yrs, minimum BMD is 0.013 and maximum BMD is 0.315 with mean BMD 0.173 with standard deviation of 0.103.

Conclusion: DEXA scan is safe and non-invasive method of detecting patient at risk of osteoporotic fracture distal radius.

Keywords: DEXA, Osteoporotic, Radius

Background

Fractures of the distal radius are extremely common. They occur more frequently in women than in men. The standard statistics in India are not available but it is assumed

that fracture distal radius is common in postmenopausal women following trivial fall [1]. In postmenopausal women, they result more commonly from low-energy falls than from high-energytrauma. Eighty-five percent of women who suffer distal radius fractures have been shown to have low bone mineral density and 51% have osteoporosis [2].

According to osteoporosis foundation fact sheet, 1 in 3 women who are over 50 years will suffer a fracture due to osteoporosis and this increases to 1 in 2 who are over 60 years of age. Postmenopausal osteoporosis, characterized by low bone mineral density (BMD), is a common condition among elderly women, with major public health consequences including disability and death caused by increased risk of hip and other fractures [3]. After the onset of menopause, women can lose an average of 2.5% of their bone per year for the first 5 years. Because of the drop in estrogen production, the skeleton becomes more sensitive to parathyroid hormone (PTH), resulting in increasedcalcium resorption from bone. The ultimate result is a decrease in PTH secretion, vitamin D production and calcium absorption and hence the occurrence of fracture and bone loss [4].

Dual energy x-ray absorptiometry (DEXA) has long been accepted as the primary method for measuring bone mineral content (BMC) and bone mineral density (BMD) because of its high precision, accuracy, and low radiation exposure. It provides information about bone strength or fragility and the risk of fractures or broken bones. The higher the density, generally, the lower the risk of fracture [5,6]. The present study was conducted to evaluate osteoporotic fractures distal end of the radius in post-menopausal women by using dexa scan.

Materials & Methods

The study was conducted in the department of Orthopaedics, Agartala government Medical College & G.B. Pant Hospital. All the patients between 45 to75 year age group postmenopausal women of attending Orthopaedics department with fracture distal end of radius were included. The patient's radiographs both AP and lateral views of forearm with wrist was taken. And bone mineral density of patients was measured by DEXA scan and compared according to WHO classification of osteoporosis. Ethical approval was taken from Institution Ethical Committee, AGMC. Informed consent was taken from patients. All details of the participating patients were recorded. The patients were assessed by antero-posterior and lateral view x-ray of wrist. Routine investigations (routine blood, blood RA factor, Thyroid function, PTH level, serum urea and creatinine, Uric acid, chest x- ray and HBs Ag) was done for all patients. All the patients would undergo height and weight measurement, noted about status of last menstrual period, amount of physical activity, activities causing joint pain. Then bone mineral density measured by using DEXA scan and compared according to WHO definition of osteoporosis. Results were analysed statistically.

Results

Table 1: Demographic characteristics

Parameters	Median	Mean	Min –Max
Age	60.6 yr	60.35 yr	45- 75 yrs
Height	153 cm	152 cm	135-166 cm
Weight	40.50 kg	41.95 kg	30.5- 60 kg

Table I shows that the mean age, height and weight of the total 100 patients was 60.35 years, 152 cmand 41.95 kg respectively.

Table 2: Activities causing joint pain

Parameters	Number	Frequency
Walking on surface	23	23%
Walking upstairs	46	46%
Walking up hills	21	21%
No pains	10	10%

Table 2 shows that among 100 osteoporotic women, 23% having joint pain while walking on the surface, 46% while walking upstairs, 21% while walking up hills and 10% having no pains.

Table 3: Average time of practising physical activity min/day by patients

Average time	Number	Frequency
<20 min	34	34%
20-40 min	37	37%
40-60 min	13	13%
>60 min	16	16%

Table 3 shows that 34% of women do physical activity for less than 20 min, 37% women do for 20-40 min, 13% do for 40-60 min and 16% do it for more than 60 min/day.

Table 4: Calculation of mean BMD in different age groups

Age Group	Min –max BMD	Mean BMD± SD
45-50 yr	0.415-0.615	0.526 ± 0.0746
51-56 yr	0.343-0.515	0.435+_0.0425
57-62 yr	0.263-0.467	0.348+_0.0583
63-68 yr	0.263-0.452	0.332+_0.0491
69-75 yr	0.013-0.315	0.173+_0.103

Table 4 shows that in 45-50 yrs age group, minimum bone mineral density is 0.415 and maximum bone mineral density is 0.615 with mean BMD of 0.526 with standard deviation of 0.0746. In 51-56 yrs age group, minimum BMD is 0.343 and maximum BMD is 0.515 with mean BMD of 0.435 with standard deviation of 0.0425. In 57-62 yrs age group, minimum BMD of 0.263 and maximum BMD of 0.467 with mean BMD of 0.348 with standard deviation of 0.0583. In 63-68 yrs age group, minimum BMD is 0.263 and maximum BMD is 0.452 with mean BMD is 0.332 with standard deviation of 0.0491. In age group 69-75 yrs, minimum BMD is 0.013 and maximum BMD is 0.315 with mean BMD 0.173 with standard deviation of 0.103.

Table 5: Calculation of mean T Score in different age groups

Age Group (years)	Min –max T score	Mean T score ± SD
45-50 yr	-5.3 - -3.0	-3.980± 0.832
51-56 yr	-6.1 - -4.0	-4.972±0.542
57-62 yr	-6.8 - -4.0	-6.018±0.692

63-68 yr	-7.0 - -4.8	-6.211±0.6199
69-75 yr	-9.9- -6.4	-8.019±1.189

Table 5 shows that in 45-50 yrs age group, minimum T score is -5.3 and maximum Tscore is -3.0, in 51-56 yrs age group minimum Tscore is -6.1 and maximum is -4.0, in 57-62 yrs age group minimum T score is -7.0 and maximum is -4.5, in 63-68 yrs age group minimum T score is -7.0 and maximum is -4.8, in 69-75 yrs age group minimum T score is -9.9 and maximum.

Discussion

The study was conducted in the department of orthopaedics, Agartala Government Medical College & G.B. Pant Hospital. All the patients were postmenopausal between 45 to 75 years of age attending outpatient department with fracture distal radius after trivial trauma and bone mineral density measured by using DEXA scan.

In our study the mean age, height and weight of total 100 patients were 60.35 yrs, 152 cm and 41.95 kg respectively. Out of total 100 osteoporotic women, 18 % women had their LMP in last 1-5 yrs, 24% women in last 6-10 yrs, 11% women in last 11-15 yrs and 47% had it more than 15 yrs back. So maximum number of postmenopausal women who came with fracture had their LMP more than 15 years back. In this study we considered association between LMP and bone mineral density. The chances of getting low bonemineral density steadily increased as LMP increased. In 1941 Albright *et al* first detected that estrogen deficiency is the major pathogenic factor of osteoporosis in postmenopausal women. Estrogen deficiency during menopause causes rapid bone loss, especially in early years of menopause. Albright F *et al* [7] worked on their country women and reported rapid bone loss especially in first 4-7 years after menopause. Rogers *et al*[8] studied 60 postmenopausal women (ages, 49-62 years), out of which 43 had gone through a natural menopause 1-20 years back and 17 had undergone hysterectomy 3-22 years ago and indicated the higher rates of bone loss in the early postmenopausal period. The results of the present study are consistent with the above findings.

We found that among 100 osteoporotic women, 23% having joint pain while walking on the surface, 46% while walking upstairs, 21% while walking up hills and 10% having no pains. We observed that 34% of women do physical activity for less than 20 min, 37% women do for 20- 40 min, 13% do for 40-60 min and 16% do it for more than 60 min/day. Bal SD, Altena TS, Swan PD[9] studied three professionally recommended anthropometric body composition prediction equations for women to dual energy X-ray absorptiometry (DEXA), and then developed an updated equation.

We found that in 45-50 yrs age group, minimum bone mineral density is 0.415 and maximum bone mineral density is 0.615 with mean BMD of 0.526 with standard deviation of 0.0746. In 51-56 yrs age group, minimum BMD is 0.343 and maximum BMD is 0.515 with mean BMD of 0.435 with standard deviation of 0.0425. In 57-62 yrs age group, minimum BMD of 0.263 and maximum BMD of 0.467 with mean BMD of 0.348 with standard deviation of 0.0583. In 63-68 yrs age group, minimum BMD is 0.263 and maximum BMD is 0.452 with mean BMD is 0.332 with standard deviation of 0.0491. In age group 69-75 yrs, minimum BMD is 0.013 and maximum BMD is 0.315 with mean BMD 0.173 with standard

deviation of 0.103. Blake GM *et al*[10] studied Dual energy x ray absorptiometry (DXA) scans to measure bone mineral density (BMD) have an important role in the evaluation of individuals at risk of osteoporosis, and in helping clinicians advise patients about the appropriate use of anti-fracture treatment. Compared with alternative bone densitometry techniques, hip and spine DXA examinations have a number of advantages that include a consensus that BMD results can be interpreted using the World Health Organization T-score definition of osteoporosis.

We found that in 45-50 yrs age group, minimum T score is -5.3 and maximum T score is -3.0, in 51-56 yrs age group minimum Tscore is -6.1 and maximum is -4.0, in 57-62 yrs age group minimum T score is -7.0 and maximum is -4.5, in 63-68 yrs age group minimum T score is -7.0 and maximum is -6.4, in 69-75 yrs age group minimum T score is -9.9 and maximum. Maseeh UZ *et al* [11] studied Dual energy X-ray absorptiometry (DEXA) is the gold standard modality for non-invasive diagnosis of osteoporosis but controversy exists about the optimal site (s) for bone mineral density (BMD) measurement. The objective was to find out impact of adding distal forearm BMD to hip and spine measurements on final diagnosis of a DEXA study.

Conclusion

DEXA scan is safe and non-invasive method of detecting patient at risk of osteoporotic fracture distal radius, and by taking preventive measure chances of getting fracture are reduced or chances of getting further fracture are reduced.

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