

Original Article

Assessment of Bone Mineral Density in old age patients (>60yrs) having proximal femur fracture

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ABSTRACT

Background: Osteoporosis, the silent disease with no symptoms until the first fracture, is a major health problem worldwide. To reduce the number and impact of hip fracture-fragility fracture, early detection and treatment of osteoporosis is needed.

Objectives: Evaluate BMD (bone mineral density) with DXA (Dual energy X-ray absorptiometry) scan in geriatric patients age>60 years having proximal femur fracture and compare them with similar group of patients without any fragility fractures.

Material and Methods:

The study was prospective study conducted on patients age of >60 years. Study Population

- Group A: 50 Patients having proximal femur fracture admitted and operated in our hospital.
- Group B: 50 age and sex adjusted persons having no fragility fracture.

All were assessed for BMD at hip with DXA scanner. Data collected and both groups were compared statistically.

Results: 60-65years is the most frequent affected age group. Significant low level of BMD or T-score as per WHO classification at hip scanned with DXA scan in group A patients than group B.

Conclusion: In India patients having hip fracture is 10 years earlier than western population. Patients with low BMD at hip are more likely to develop proximal hip fracture. BMD may serve as a guidance to initiate early assessment of BMD as preventive measure of osteoporosis and fractures among ageing men population.

Key words: Fragility fracture, Bone Mineral Density (BMD), Hip fracture

INTRODUCTION

Life expectancy is increasing due to improved hygiene, vaccinations, better nutrition and improved treatments for certain diagnoses during recent decades but better living circumstances such as housing have also contributed. However, problems come with increasing age associated with the musculoskeletal system and osteoporosis is one of the most common diseases.

Osteoporosis is a multifactorial disease of the skeleton, controlled by genetic, environmental and nutritional influences, with genetics the most important, determining approximately 50–70% of variance in bone mass and environmental factors contributing 30%. The definition of osteoporosis is that “it is a 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” [1].

The ultimate outcome of osteoporosis is the fragility fractures caused by higher skeletal fragility, which develops: (1) When the bone mass is decreased; (2) Due to inefficient architecture of bone; and (3) When bone quality decreases. If the age adjusted incidence of hip fractures remains unchanged, there will be an estimated increase from 1.7 million hip fractures in 1990 to 6.3 million in 2050. Hip fractures have an exponential increase with age as the rate is 2/100,000 person years in women under age 35, but this explodes to 3,032/100,000 person-years at 85 years of age. There is higher susceptibility to fracture in women than men [2].

The clinical consequence of lower bone mass is fracture, which is why the focus has been on the ability of the different techniques to predict the probability of fracture. For hip BMD, measured with DXA, it provides a strong indicator of fracture risk, especially for computing the long-term fracture probabilities [3].

WHO classification for definition of osteoporosis [4]

Diagnosis	Definition	T-score
Normal	BMD<1SD below average of young adult mean	>-1 SD
Osteopenia	BMD -1 to -2.5 SD below average of young adult mean	-1 to -2.5 SD
Osteoporosis	BMD>2.5SD below average of young adult mean	<-2.5 SD

Here, a cut-off value at 2.5 standard deviations below the average of young adults was suggested in order to set the diagnosis osteoporosis. As described before, relative scores are used clinically; T-scores and Z-scores, and they are calculated based on reference values. These diagnostic criteria were based on measurements with dual energy X-ray absorptiometry (DXA), which is the technique validated for assessing bone mineral density.

MATERIALS AND METHODS

Study area, duration: The study was conducted from July-2013 to November 2015 at Shri M.P.Shah Government Medical College, G. G. G. hospital, Jamnagar Gujarat, India.

Inclusion criteria & sample size: Total 50 patients having proximal femur fracture admitted and 50 patients having no fragility fracture were selected from the outpatient department of Orthopedics.

Exclusion Criteria:

- Person with metabolic disorders or treatment affecting calcium metabolism.
- Persons with nephrolithiasis or urolithiasis.
- Associated medical illness such as rheumatoid ds, tumors, endocrinal disease, skin disease or patients who having history of taking steroids, hormones or chemotherapy.
- Having multiple fractures

Methodology: In group A after post operative period when patient is pain free, patient is brought to DXA scan room. Firstly his/her weight in kg and height in cm measured, BMI is calculated. And then they are scanned at hip using DXA scanner. In group B volunteers selected were otherwise fit patient having no history of fragility fracture or major illness. They were given prior appointment for DXA scan and data are collected accordingly. The diagnosis of Osteoporosis and Osteopenia were done according to WHO T-score criteria. The whole data was collected and statistically analysed using appropriate statistical methods.

Ethical clearance: An informed consent was taken from all the participants and relevant questionnaire was given to them. The study protocol was approved by local Ethical Committee.

RESULTS

Patients in both groups were selected randomly having >60 yrs of age. 60-65 yrs is the most frequent affected age group in both groups in this study (Table 1).

In group A patients selected randomly and found that in group A the ratio of male to female is 1:2.33. For better comparison among all groups sex ratio has been maintained equally (Table 1).

Table-1: Age distribution among groups

	Group A (n=50)	Group B (n=50)
Age (yrs)		
60-65	22(44%)	24(48%)
66-70	9(18%)	11(22%)
71-75	14(28%)	9(18%)
76-80	5(10%)	6(12%)
Gender		
Male	15(30%)	10(30%)
Female	35(70%)	25(70%)

In this study it is the low velocity /trivial fall injury which is most common mode of trauma in such fragile fracture which is 82% of all cases than other high velocity trauma as RTA etc. which is 18% of all cases (Table 2).

Table 2: Mode of injury

MODE OF INJURY	Group A (n=50)
Trivial Fall	41(82%)
RTA/high velocity trauma	9(18%)

Table 3: BMD and T-score at femur neck

T-score	BMD(gm/cm ²)	CASES (% , n=50)	CONTROL (% , n=50)
<-6	<0.500	11(22%)	0
-6 to -5	0.500-0.600	10(20%)	6(12%)
-5 to -4	0.601-0.700	9(18%)	9(18%)
-4 to -3	0.701-0.800	10(20%)	10(20%)
-3 to -2	0.801-0.900	5(10%)	14(28%)
-2 to -1	0.901-1.00	2(4%)	4(8%)
>-1.0	>1.00	3(6%)	7(14%)

Table 4: Diagnosis as per WHO classification

BMD at femur neck	Cases (n=50)	Control (n=50)
Normal	5(10%)	9(18%)
Osteopenia	10(20%)	15(30%)
Osteoporosis	35(70%)	26(52%)

In group A out of 50 cases, according to WHO classification 35(70%) were osteoporotic, 10(20%) were osteopenic and 5(10%) were normal. Whereas In group B out of 50 cases, according to WHO classification 26(52%) were osteoporotic, 15(30%) were osteopenic and 9(18%) were normal.

Table 5: Mean BMD at femur neck

	Group A		Group B	
	Mean BMD	T-score	Mean BMD	T-score
Male	0.618	-3.65	0.818	-2.12
Female	0.604	-3.71	0.753	-2.81

In group A males have mean BMD of 0.618 gm/cm² and females have 0.604gm/cm² whereas in group B males have mean BMD of 0.818 gm/cm² and females have 0.753gm/cm². So above table shows females have lower BMD and T-score as compare to Males among both groups and overall group A has lower BMD and T-score as compare to group B.

DISCUSSION

In India as per INTERNATIONAL OSTEOPOROSIS FOUNDATION most common age group affected is around 60yrs of age. In western population 70-80yrs is most frequent affected age group having hip fracture [5]. So in India fragility fractures occur 10-20years earlier than western population. According to data from Rockwood and greens fractures [6] the age group most commonly affected for proximal femur is 75-80years. In my study most common age group affected is 60-65yrs as only >60yrs of age were included in my study.

In present study it is low velocity /trivial fall injury which is most common 82% mode of trauma in such fragile fracture than other high velocity trauma as RTA etc. which is comparable to study of I Isnani et al, in his study trivial fall injury is most common 81.3% [7].

In Ripamonti et al [8] study, they include ≥ 65 years of age. Most common age group in case study is 70-75yrs in their study while in present study it is 60-65yrs. Mean age in control group is 65-70yrs in their study while in present study it is 60-65yrs. There were larger number sample in control group, compare to our study. In present study case group is having mean BMD at femur neck is

0.608gm/cm² which is 0.618gm/cm² in Ripamonti et al study. Whereas control group is having mean BMD at femur neck is 0.78gm/cm² which is 0.73gm/cm² in Ripamonti et al study [8].

CONCLUSION

There is high prevalence and lack of awareness regarding osteoporosis in our population. There should be emphasis on treatment which can prevent such fragility fractures and associated morbidity and mortality.

REFERENCES

1. McLellan AR, Wolowacz SE, Zimovetz EA, Fracture liaison services for the evaluation and management of patients with osteoporotic fracture: a cost-effectiveness evaluation based on data collected over 8 years of service provision. *Osteoporos Int* 2011;22(7):2083-98.
2. Cooper C, Campion G, Melton LJ. Hip fractures in the elderly: a world-wide projection. *Osteoporosis Int* 1992;2:285-89.
3. Kanis JA, Joseph M, Claus C, Conard J, Nikolai K. The diagnosis of osteoporosis. *Journal of Bone and Mineral Research* 1994;9:1137-41
4. Herd RJ, Blake GM, Parker JC, Ryan PJ, Fogelman I. Total body studies in normal British women using dual energy X-ray absorptiometry. *Br J Radiol* 1993;66(784):303-8.
5. International osteoporosis foundation 2010. available from: <https://www.iofbonehealth.org/facts-statistics>
6. Charles CB, James H, Margaret M. Rockwood and greens fractures in adults. 8th edition. Kolters kluwer; Philadelphia: 2015.
7. Isnani I, Mohamad AB, Murallitharam M, Tajuddin A, Jaya PS, Manmohan S et al. Pre injury demographic pattern of patients sustaining hip fractures in malayasia *Malays Orthop J* 2012;6:11-5
8. Ripamonti C, Lisi L, Avella M. Femoral neck shaft angle width is associated with hip fracture *Br J Radiol* 2014;87(1037):3035-8

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