

## Dexa Scan and Its Implication of Fracture Factors in Osteoporosis

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### Abstract

*Method:* Prospective study of 150 patients with suspected osteoporosis and underwent dexa scan. The inclusion criteria are patients above 50 years of age and trivial injury. The exclusion criteria are any pathological fracture, age above 50 years, any associated fractures. All 150 patients were assessed by various risk factors like age, gender, weight, alcohol etc.

*Result:* The mean T score for normal, osteopenic and osteoporosis patient are -0.47, -1.71 and -3.43 respectively. On analyzing the risk factors 88% of patient between age group seventy one to eighty, 49% of male, 55% of smokers, 57% of alcoholic, 68% of chronic medical illness had fractures.

*Conclusion:* The negative t-score value along with risk factors increases the risk of hip fracture significantly  
Level of Evidence

Level 1

**Indexing Term;** OSTEOPOROSIS, DEXA, BMD

### I. Aim

To evaluate the risk factors for fractures in an osteoporotic bone using dexa scan.

### II. Materials And Methods

This is a prospective study done in **Sri Ramachandra Medical college**, Chennai during the period of April 2013 to April 2015. 150 patients who came to our hospital as in patient or out patient with suspected osteoporosis and underwent dexa scan. The inclusion criteria are patients above 50 years of age and trivial injury. The exclusion criteria are any pathological fracture, age above 50 years, any associated fractures. All the 150 patients included in our study underwent dexa scan and were divided into three group containing fifty patients. Group I --- Normal (T - score below -1.00), Group II --- Osteopenia (T - score between -1.00 to 2.5) Group III --- Osteoporosis (T - score above -2.50). Out of 150 patients sixty nine patients had fracture. All 150 patients were assessed by the following risk factors age, gender, weight, alcohol, smoking, chronic drug intake like steroids, anticonvulsants, chronic medical illness (Diabetes, cardiovascular disease, chronic kidney disease, COPD, bronchial asthma, cerebrovascular disease, seizure disorder.)

### III. Results

In group I none of the patient had fracture. In group II twenty five patients had fracture while in group III forty four patients had fracture. The mean BMD for normal patient is .945, osteopenia patient is .799 and for osteoporosis patient is .593. The mean T score for normal, osteopenic and osteoporosis patient are -0.47, -1.71 and -3.43 respectively. 88% of patient between age group seventy one to eighty, 49% of male, 55% of smokers, 57% of alcoholic, 68% of chronic medical illness had fractures

### IV. Case Illustrations

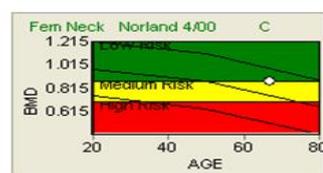
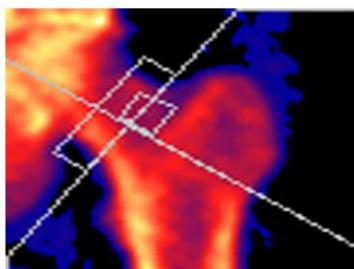
#### GROUP I

Mr. R, Hp no: 011,66/m, No h/o fracture, No other medical illness, H/O Alcoholic,

BMD: .8748, T-Score: -0.96,

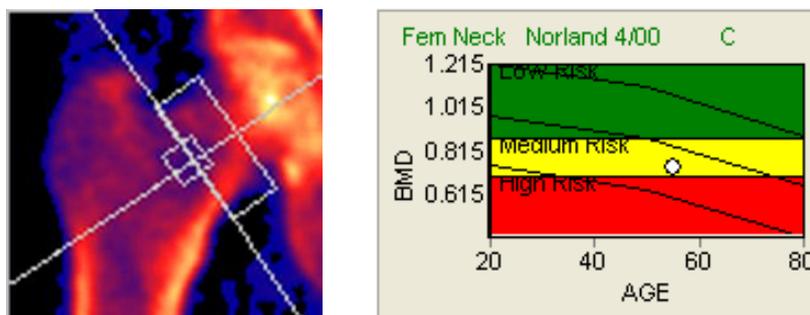
WHO CAT: **Normal**

RISK: **low**



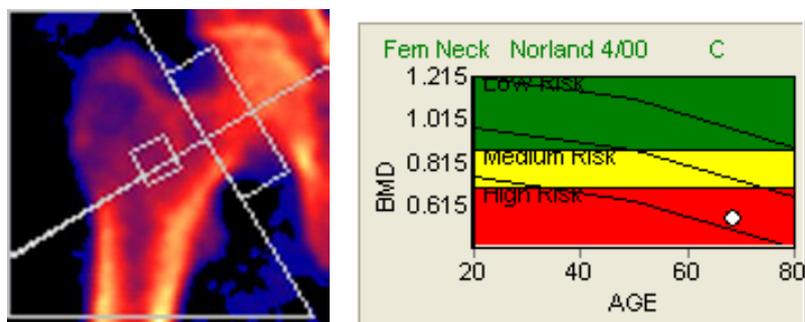
**GROUP II**

Mr. C ,55/m ,Hp no: J7287, No h/o fracture, H/O Hypertension, H/O Smoking/alcoholic, BMD: .7445, T-score: -2.07, WHO CAT: **Osteopenia, RISK: Moderate**



**GROUP III**

Mrs. KM, 68/f ,Hp no: 629922 ,H/O Slip and fall, H/O hypertension Left hip Neck of femur #, H/O Post menopause, BMD: 0.5582, T score: -3.66, WHO CAT: **Osteoporosis RISK: High**



**V. Discussion**

In our study we have assessed 150 patients who underwent dexa scan and assessed with various risk factors like age, sex, weight, smoking, alcohol, steroid intake, and chronic medical illness.

**BMD**

BMD provides a strong risk indicator for fracture risk that is largely independent of sex. The significance of BMD as a risk factor depends on the level of BMD when used to predict any fracture or any osteoporotic fracture<sup>7</sup>. There was a significant decrease in BMD for fracture patients compared to uninjured people of the same age group in the study done by KARLSSON et al 1993.<sup>5</sup> In our study also we found decrease in BMD in fracture patients in comparison with uninjured people.

**AGE**

With an increase in age there is a significant decrease in BMD and the chance of fracture is high. The prevalence of fracture increases exponentially with age, 90% of fractures of hip occur in individuals who are more than 70 years old. 90% of these fractures are as a result of a simple fall. AC COURTNEY, EF WACHTE et al 1995.<sup>1</sup> In our study we found numbers of fractures were more in 60-70 years age group and significantly high in 71-80 years, which proves that increase in age, has a significant chance of fracture.

**GENDER:**

Compared with women, elderly men presenting with fracture with associated risk factors have high chance for osteoporosis. Like women with fracture, men are usually fragile, with pre-existing medical illness and fracture-related complications contributing to their overall poor outcomes. TERRENCE H DIAMOND, STEPHEN W THORNLEY et al 1997.<sup>11</sup> In our study risk of fracture in elderly men was higher than women.

**WEIGHT:**

Weight increases the mechanical strain on bone, stimulating bone remodeling; and low body weight can be a marker for poor health status, itself a risk factor for falls and fractures. Low body weight < 58kg has

increased risk of fractures, Low body weight is very useful predictor of fracture were BMD is Unknown JN PARTHOUSE, Y.F BRIRKS et al 2004.<sup>4</sup>In our study risk percentage of fractures those who are less than 58 kg is significant. (52%).

#### **STEROID INTAKE:**

They impair the replication and differentiation of osteoblasts, as well as induce apoptosis in mature osteoblasts. Glucocorticoids also down regulate genes encoding matrix proteins such as collagen and osteocalcin. Finally, glucocorticoids are associated with reduced intestinal calcium absorption as a result of down regulating the gene encoding TRPV6, a Ca<sup>2+</sup> channel normally expressed in duodenal epithelium. Although vitamin D supplementation given alongside glucocorticoids can negate the damage to bone.<sup>2</sup>Influences of corticosteroids on bone density are numerous. There is consistent evidence that use of these agents is associated with a reduction in bone density, particularly in areas which contain a large proportion of trabecular bone. Chronic steroid intake percentage of risk factors was 30% in the study done by IRENE LAMBRINOUDAKI AND ANNIE W.C KUNG et al 2000.<sup>3</sup> In our study risk of fractures with chronic steroid intake was 63%.

#### **ALCOHOL:**

This relationship is not simply a result of falls under the influence of alcohol as histological changes have also been noted in the bone structure of alcohol abusers. However, these may be partially explained by confounding factors associated with alcoholism such as liver damage, hypogonadism and nutritional deficiencies. Nevertheless, alcohol is known to increase parathyroid hormone (PTH) and to reduce concentrations of vitamin D metabolites required for efficient calcium absorption. Furthermore, alcohol suppresses bone mineralization by osteoblasts.<sup>2</sup>Risk of fractures with alcohol Intake was 76% in the study done by FUJIWARA et al 1997.<sup>10</sup>In our study risk of fractures with alcohol intake was 60%.

#### **SMOKING:**

As populations age the world over, osteoporosis, or loss of bone mineral density, will generate an increasing burden of disease. Far more common among women than men, osteoporosis itself is less a disease than a risk factor because people with osteoporosis have much higher risk of fractures, particularly of the hip and vertebrae. Hip fractures often cause substantial disability and may prevent someone from returning home even after surgery and rehabilitation, if their home is unsuitable for their impaired mobility. The strongest evidence of the effects of smoking in decreasing bone mineral density comes from a metaanalysis which considered 29 studies and concluded that *roughly one in eight fractures is attributable to cigarette smoking*. Fracture risk among smokers is greater at all ages but rises from 17% greater at age 60 to 71% at age 80 and 108% at age 90. Risks are lower in former smokers, suggesting a benefit of quitting smoking in slowing the rate of bone loss.<sup>8</sup>Susanne hoidrup, Eva Prescott, Jes bruun in 2000 Smoking may cause changes in the metabolism of hormones that affect bone strength, in their study risk of fractures due to smoking is 19 %.<sup>9</sup>In our study risk of fractures with smoking is 59%.

#### **MEDICAL ILLNESS:**

Falls are common among the elderly, and represent the leading cause of hip fractures with associated complications as organ system failure and mobility dysfunction. A lot of causes of falls in older people are reported including medical conditions, increasing age, medication use and social factors. The rapid growth of the elderly population has resulted in a proportional rise in the number of elderly individuals with chronic disability during this phase of life. Chronic disability directly interferes with the quality of life of the elderly, since it changes their way of living and their health conditions. Risk of fracture with medical illness Malek M. Ghnaimat MD et al 2007. (86.25 %).<sup>6</sup> In our study there is a increase risk of fracture with Chronic medical illness (74%).

### **VI. Conclusion**

- Patients in group I in dexa scan with risk factors are unlikely to have a risk for fracture.
- Patient in group II in dexa scan with risk factors have a 50% chance of risk for fractures.
- Patients in group III in dexa scan with risk factors have a very high risk for fracture.
- Early diagnosis of osteopenia / osteoporosis by dexa scan and identification of risk factors and proper management for osteoporosis and elimination of risk factors will go a long way in bringing down the number of osteoporotic fracture.
- Hence we conclude that negative t-score value along with risk factors increases the risk of fracture significantly

- The increase in fracture cases is greater than expected due to an aging population, suggesting the existence of other factors influencing this higher incidence. This information should alert the health authorities so they may begin to initiate plans of prevention and management of these very debilitating injuries.

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### TABLES

#### GROUP I: Normal

Total no of patients	with fracture	Without fracture
50	Nil	50

#### GROUP II: Osteopenia

Total no of patients	with fracture	Without fracture
50	25	25

#### GROUP III: Osteoporosis

Total no of patients	with fracture	without fracture
50	44	6

#### MEAN BMD FOR 150 PATIENTS

BMD hip	Patients	MeanG/cm2
NORMAL	50	.93252
OSTEOPENIA	50	.78539
OSTEOPOROSIS	50	.58645

#### MEAN T-SCORE FOR 150 PATIENTS

T-score	Patients	Mean
NORMAL	50	-0.4765
OSTEOPENIA	50	-1.7177
OSTEOPOROSIS	50	-3.430

#### RISK FACTORS:

##### AGE

Age group	No of patients	With fracture	Percentage
50- 60	54	7	12.9%
61-70	46	18	39.1 %
71-80	50	44	88 %

##### SEX

Sex	No of patients	With fracture	Percentage
MALE	70	34	48.5
FEMALE	80	35	43.7

**WEIGHT**

Weight	No of patients	With fracture	Percentage
< 58 KG	66	33	50
> 58 kg	84	36	42.8

**SMOKING**

No of Patients	Smokers (42)	Non smokers (118)
	With fracture	With fracture
150	23	46
Percentage	54.7	38.9

**ALCOHOL**

No of patients	Alcoholic(35)	Non alcoholic(115)
	With fracture	With fracture
150	20	49
percentage	57.1	42.6

**STEROID**

No of patients	With steroid intake(38)	Without steroid intake (112)
	With fracture	With fracture
150	24	45
percentage	63.1	40.1

**CHRONIC MEDICAL ILLNESS**

No of patients	With illness(93)	Without illness(57)
	With fracture	With fracture
150	63	06
Percentage	67.7	10.5