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## To assess the role of VIT. D3 in proximal femur Fracture in elderly patients

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### Abstract

**Background:** The purpose of the present study was to assess the role of vitamin D3 in proximal femur fracture in elderly patients.

**Methods:** This is a retrospective study of 120 elderly patient presenting with lower limb fracture who were evaluated clinically and radiologically. Serum vitamin D3 level assessment done in all patient.

**Results:** In my study, I have studied 120 patients of aged more than 60 years, presented to our hospital with lower limb trauma, 62.5% had proximal femoral fractures and 38.5% had other fractures of lower limb. Out of those patients 43% patients were male and 57% were female, which comes to 1:1.3 of male to female ratio. Previous history of fall is very common factor associated with proximal femoral fractures, in my study history of fall was associated with 42% of patients. Distribution of fractures was equal 1: 1 in patients not having history of fall. Proximal femoral fractures was four times more common in patients with previous history of fall, recurrent fall is due to proximal muscle weakness, imbalance, poor eye sight, loss of protective mechanism. In my study 43% of patients have serum d3 level <20 ng/dl, 34 % have serum vitamin d3 level 20 -30 ng/dl, and 23% have serum vitamin d3 level >30 ng/dl. Grading of the osteoporosis with singh index was noted in my study 60% of patients have singh osteoporotic index 3 or less than 3, and most of them had proximal femoral fractures. Patients having fractures of lower limb other than proximal femur have singh osteoporotic index 4 or more than 4. in patients of proximal femoral fractures most of them have singh osteoporotic index 3 or less than 3 and also most of them have serum vitamin d3 level <30 ng /dl.

**Conclusions:** Assessment of vitamin d3 in proximal femoral fracture patients, it shows in Increase incidence proximal femoral fracture in low vitamin d3 level. Adequate dietary calcium intake has been associated with decrease rate of proximal femoral fractures, patients having proximal femoral fractures 66% was taking dietary calcium intake > 750 mg per day. same type of finding was found by feskanschi *et al.* in patients taking high dietary calcium and vitamin d3 intake have less chance of hip fractures.

**Keywords:** Role of VIT. D3, proximal femur Fracture, elderly patients

### Introduction

As the life expectancy is increasing osteoporosis has assumed an enormous proportion and has become a major health problem worldwide [1]. Epidemiological studies in India indicate that the prevalence of low bone density is highest in the India [2]. Osteoporotic fractures tend to occur relatively early (10-20 years earlier) in Indian population than in their western counterparts and they are more common in women [3]. Osteoporosis and subsequent osteoporotic fractures are very common. Every second middle-aged woman will eventually suffer from a fracture [4]. These fractures contribute to substantial suffering for the patient [5], as well as a severe economic burden for society [4, 6, 7]. The cause of osteoporosis is multifactorial but vitamin D deficiency is considered one possible risk factor, although the importance of vitamin D for bone health, especially in a general population, is not well understood. Even then supplementation with vitamin D and calcium is a well established treatment for osteoporosis and prevention of osteoporotic fractures.

Hip fractures were described as early as in the 1630s [8]. During the 19th century bone fragility, the different fracture types and their relation to age and sex were described [8]. It was established in the 1960s that the majority of hip fracture occurred among women, due to high fragility of bone.

Hip fracture incidence doubled for every five year of increase of age [9]. Mortality after a hip fracture caused by a moderate trauma was around 20% in those time [10]. The results of hip fracture surgeries in the 1950s were uncertain; mortality related to surgeries were equal in some studies and lowered in others compared to a conservative approach [10].

**Risk factors for fracture around hip**

**The fracture risk is dependent on several mechanisms**

Minor twist followed by fall usually precedes a fragility fracture [11]. Fall in elderly individual is often multifactorial, caused by a combination of imbalance (due to impaired mobility, diseases or sedatives) and inadequate adaptation to home hazards [12, 13].

**Trauma Type**

The trauma contributing to a fragility fracture is usually a fall from standing at ground level. Hip fractures are usually preceded by a fall sideways [14-16].

**Energy Absorption**

Fall energy is absorbed both by the skeleton and the adipose tissue, embedding the skeleton. Less adipose tissue on the hips increase the chance of hip fracture [16, 17]. An inadequate muscular defense reaction to fall can also increase the risk of hip fracture.

**Bone Strength**

The bone strength is dependent on skeletal BMD, 9 but also on the quality, geometry, 2, [18] and size of the proximal femur [19, 20]. These factors are largely determined by genetics [21].

All these risk factor are found to be interdependent to each other.

**Aims and Objectives of study**

1. To asses the role of vitamin D3 deficiency in proximal femoral fractures.
2. Radiological grading of osteoporosis.

**Materials and methods**

**Source of data**

The proposed study has been conducted at Nehru hospital attached to the “Baba raghav das medical college, Gorakhpur “during the term between” Feb. 2012 to October 2013”

**Method of collection of data (including sampling procedures if any)**

In the proposed study a minimum of 30 elderly patient presenting with lower limb fracture admitted to” Nehru hospital” were evaluated clinically and radiologically. Serum vitamin D3 level assessment done in all patient.

**Inclusion Criteria**

Patient more than 55 years, both sex, having lower limb fracture were included and were assessed radiologically, and serum vitamin d3 level was investigated.

**Exclusion Criteria**

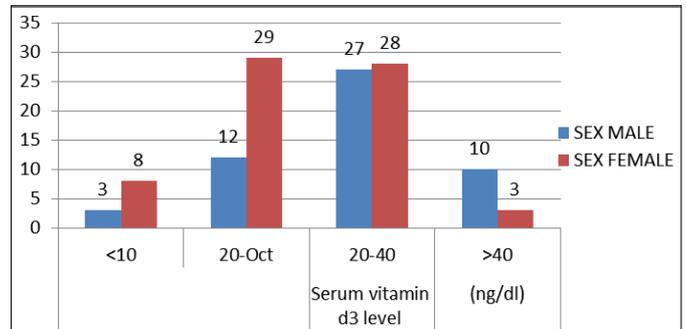
Pathological fractures were excluded.

**Imaging Study**

Pelvis with both hip –AP view  
Observation

Relation between serum vitamin d3 level and sex

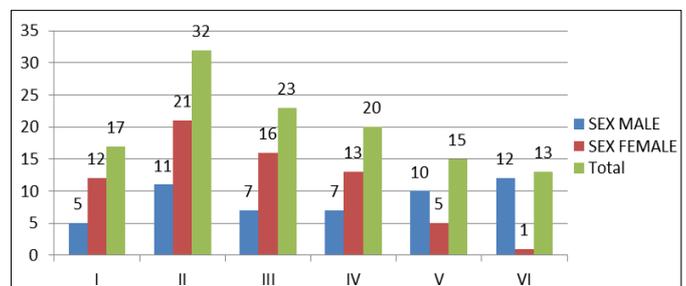
	Sex		Total		
	Male	Female			
Serum vitamin d3 level (ng/dl)	<10	3	8	11	
	10-20	12	29	41	
	20-40	27	28	55	
	>40	10	3	13	
Total			52	68	120



28% of male patients have serum vitamin d3 level less than 20 ng/dl, and 55% of female patients have serum vitamin d3 level less than 20 ng /dl.

Relation between osteoporotic sugh index and sex

	Sex		Total		
	Male	Female			
Osteoporotic sugh index	I	5	12	17	
	II	11	21	32	
	III	07	16	23	
	IV	7	13	20	
	V	10	05	15	
	VI	12	1	13	
Total			52	68	120



In my study group 72% of patients of female sex have osteoporotic sugh index III or less than III, how so ever 44% of male patients have osteoporotic sugh index III or less than III.

**Discussion**

Incidence of proximal femoral fractures in Indian sub-continent is high, and these fractures are mostly low velocity fractures associated with trivial injury. These fractures have multiple risk factors and most of which are preventable.

In my study, I have studied 120 patients of aged more than 60 years, presented to our hospital with lower limb trauma, 62.5% had proximal femoral fractures and 38.5 %had other fractures of lower limb. out of those patients 43% patients were male and 57% were female, which comes to 1:1.3 of male to female ratio, study conducted by Ramalho AC, Lazaretti-Castro M, found male female ratio for

elderly patients with proximal femoral fractures to be 1:3.1, and by Bartonicek J, Dzupa V, Fric V, 1:2.5. High incidence of fracture in female population is probably because of higher incidence of osteoporosis in elderly female.

The ratio of proximal femoral fractures and other fractures of lower limb is in age group 60-70 year is 2:1, in age group >70-80 year 1.5:1, and in patients aged more than 80 year, it was 2:1 again. Proximal femur is more prone for fractures, due to trivial fall, direct trauma over trochanteric area, loss of protective muscle and fat around hip, and associated osteoporosis can explain higher rate of proximal femoral fractures than other.

Previous history of fall is very common factor associated with proximal femoral fractures, in my study history of fall was associated with 42% of patients. Distribution of fractures was equal 1:1 in patients not having history of fall. Proximal femoral fractures was four times more common in patients with previous history of fall, recurrent fall is due to proximal muscle weakness, imbalance, poor eye sight, loss of protective mechanism. It is modifiable risk factor for prevention of proximal femoral fractures in elderly patients. Study done by Bischoff Ferrari *et al.* found similar result and concluded that history of fall is commonly associated with proximal femoral fracture. Campbell *et al.* found that in his study 90% of hip fractures were preceded by fall and in my study 70% of hip fractures had previous history of fall.

Sedentary activity level makes patients prone to proximal femoral fractures as contrast to normal activity level. In our patients group 90% of patients with sedentary activity level have proximal femoral fractures as compare to only 25% of patients with normal activity levels, activity has high link of association for prevention of proximal femoral fractures, same type of study done by Ringsberg KA *et al.*, found women regularly performing moderate exercise program have better muscle strength and gait and sustained fewer fractures.

Smoking have significant bad effect on skeleton health, it has been found to have association with osteoporosis so with proximal femoral fractures. In my study 40% of patients found to be smoker and 28% patients were smoking more than 20 pack year, and there is high rate of proximal femoral fractures in this group. Study done by Law MR, Hackshaw *et al.* found smoking as risk factor for lower postmenopausal BMD and increase hip fractures risk.

A high alcohol intake increase risk of osteoporosis and fall, which lead to increase rate of hip fractures as studied by Kanis JA *et al.* In my study there were 21% of patients were taking alcohol, and it had no effect on distribution of fractures.

In my study 43% of patients have serum d3 level <20 ng/dl, 34% have serum vitamin d3 level 20-30 ng/dl, and 23% have serum vitamin d3 level >30 ng/dl. In study done by vivek arya and rajiv brahmi in Indian population 78.8% patients has been found to have serum vitamin level <20 ng/dl. and study done by Kristine E. Ensrud, Brent C. Taylor, Misti L. Paudel, found serum vitamin D level of 110 men (9%) had a 25(OH)D level below 15.0 ng/ml, 184 (14%) had a 25(OH)D level of 15.0-19.9 ng/ml, 605 (47%) had a 25(OH)D level of 20.0-29.9 ng/ml, and 376 (29%) had a 25(OH)D level of at least 30.0 ng/ml. Harinarayan *et al.* found 18% of patients serum vitamin d3 level >20 ng/dl, 52% patients have serum vitamin d3 level 10-20ng/dl, and 30% patients have serum vitamin level <10ng/dl.

Grading of the osteoporosis with singh index was noted in my study 60% of patients have singh osteoporotic index 3 or less than 3, and most of them had proximal femoral fractures.

Patients having fractures of lower limb other than proximal femur have singh osteoporotic index 4 or more than 4. In patients of proximal femoral fractures most of them have singh osteoporotic index 3 or less than 3 and also most of them have serum vitamin d3 level <30 ng/dl. T Masud, S Jawed, did study in singh index and bone mineral density, and their data suggest that the Singh index is a reproducible tool which may detect differences in bone mass between populations or subgroups within populations, and found sensitivity and specificity of the Singh method diagnosing low bone mass to be 35.1% and 90.0%, respectively.

In my study incidence of diabetics was in 10% of patients and fractures distribution had no gender bias. But laui *et al.* has found increase incidence of proximal femoral fractures in female patients with diabetics.

In my study no correlation was found between type of fracture and vitamin d3 and calcium supplementation, and most of patients taking these supplementation had serum vitamin d3 level >30ng/dl, similar finding were found by dawson *et al.* Anderson *et al.* in their study.

### Conclusion

- Proximal Femoral Fractures were more common in Females (53/75), while other lower limb Fractures were common in Males (30/45).
- Proximal femoral Fractures are more common in all Age groups in my study in elderly patients.
- Significant patients have previous History of Falls (50/120) and in them proximal Femoral Fractures were more common as compare to other lower limb fractures (41/50).
- Decreased activity level was highly associated with Proximal Femoral Fractures (45/50) as compare to other lower limb fractures (5/50)
- Non-Smokers and person smoking <20 pack year shows no significant difference in fractures of lower limb but patients smoking >20 pack year have more fractures of proximal femur (32/35) as compare to other lower limb fractures (3/35)
- In total 75 patients of proximal femoral fractures 65 patients were not taking alcohol or taking <40 ml alcohol per day as compare to 36 patients out of 45 patients of other fractures of lower limb. So no major difference was found of fracture type in either group.
- Most of the patients were not taking Vitamin D3 Supplementation regularly (107/120) total patients taking Vitamin D3 Supplementation were 13 and no difference in fracture type was found.
- Only 16 patients were taking calcium supplementation in my study and there was equal distribution of patients in fracture type either taking or not taking calcium supplementation irrespective of dose of calcium supplementation.
- Patients having Dietary Calcium Intake more than 750 mg per day have less chances of having proximal femoral fracture 27/70 as compare to the patients having <750 mg Dietary Calcium Intake (48/50).
- Patients having daily milk intake more than 1 glass have no significant difference in fracture type, as compare to <1 glass milk per day in which all have proximal femoral fracture.
- Diabetes Mellitus & Hypertension has no effect on fracture type, patients with history of prolonged immobilization have significant correlation for risk of proximal femoral fracture.

- 52 patients out of 120 patients were having Serum Vitamin D3 Level <20ng/dl, in which 44 patients had proximal femoral fracture but patients having >20 ng/dl have approximately equal distribution of fracture (31/68) Vs (37/68).
- Patients having proximal femoral fracture 71/75 have osteoporotic singh index III or less than III, and other fracture group 44/45 have osteoporotic singh index IV or more than IV.
- There were equal distribution of patients with body mass index less than 25kg /meter-square and more than that.
- In my study group 80/120 patients were having height <165 cm. out of which 54 were having proximal femoral fracture.
- All patients having weight <55kg have proximal femoral fractures and out of 96 patients having weight >55kg, 51 have proximal femoral fracture as compare to 45 having other fractures of lower limb fracture.
- Assessment of vitamin d3 in proximal femoral fracture patients, it shows in increase incidence proximal femoral fracture in low vitamin d3 level.
- Patients with proximal femoral fracture patients with serum vitamin d3 level <20ng/dl 46 % have osteoporotic singh index II
- Patients with vitamin d3 level 20-30 ng/dl 90% of my patients osteoporotic singh index II or III.
- Patients with vitamin d3 level >30 ng/dl, 54% of my patients had osteoporotic singh index II or I.
- Patients with proximal femoral fracture, 66% patients have osteoporotic singh index I or II.
- Patients of my study male female ratio was 1:1.3, and 60 % of patients were in the age group of 60 to 70 year.
- Most of the patients were having weight ranging from 55 kg to 65 kg, 10% patient had weight more than 75 kg and 23% patient have weight less than 55kg.
- 28% of male patients have serum vitamin d3 level less than 20 ng/dl, and 55% of female patients have serum vitamin d3 level less than 20 ng /dl.
- In my study group 72% of patients of female sex have osteoporotic singh index III or less than III, how so ever 44% of male patients have osteoporotic singh index III or less than III.

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