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Correlation of vitamin D levels with types of proximal femoral fractures in elderly patients – A Cross sectional study

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Abstract

Background: Proximal femoral fractures are very common in elderly patients. These fractures are thought to be associated with osteoporosis. Vitamin D is a possible risk factor for osteoporosis. So, this study was done to evaluate the association of serum vitamin D level with types of femoral fractures in elderly patients.

Methods: The study was done among 120 patients with age >60 years (male and female both) with proximal femoral fractures were studied. Serum 25-hydroxy vitamin D, calcium, phosphate, alkaline phosphatase levels, liver function test, renal function test, hemoglobin and complete blood counts of all the patients were assessed.

Results: On assessment of serum vitamin D in proximal femoral fracture in elderly patients, it shows an increase incidence of proximal femoral fractures in patients with low serum vitamin D level. Fracture of neck of femur was most common among all. Type of fracture has no significant statistical relationship with serum vitamin D levels.

Conclusions: Osteoporosis and serum vitamin D level depends on age and sex of the patient. But type of proximal femoral osteoporotic fracture has no association with either grade of osteoporosis or serum vitamin D level.

Keywords: Proximal femoral fractures, Vitamin D, Elderly, Fracture neck of femur, Osteoporosis.

Introduction

Hip fractures and related disabilities are important public health issues for elderly people around the world including developing nation like India. Actual numbers of fractures are

increasing steadily due to the increasing proportion of the elderly population [1]. Despite the resources of modern medicine, there is a high mortality rate, around 25-30% yearly [2, 3]. However, since the density of population is higher in Asia, by 2050, the incidence of hip fractures is estimated to contribute more than 50% in the world [4].

Among the micronutrients relating to the risk of falls and fractures among elderly people, vitamin D can be highlighted. Low vitamin D levels are commonly associated with because ofmultiple factors such as decreased sun exposure with reduced skin production of vitamin D and low dietary D2/D3 intake. The skin's ability to produce vitamin D3 from the pre-vitamin 7-dehydrocholesterol also declines with advancing age [5]. It has been presumed that Indians are vitamin D sufficient as Indian subcontinent is situated between 8.4N and 37.6N latitude and has adequate sunshine and UV-B rays (290-315 nm) reaching the earth's surface throughout the year. However, a recent study has suggested a highprevalence of subnormal 25-hydroxy vitamin D concentration among healthy Indians [6]. In the present study, it was planned to assess serum vitamin D levels and routine bone biochemistry in elderly patients who presented with proximal femoral fractures and to study association of serum vitamin D with osteoporotic proximal femoral fractures in elderly patients and also to study association of type of proximal femoral fracture with grade of osteoporosis and serum vitamin D level.

Methods

This cross-sectional study was conducted in the Department of Orthopedics, Basaveshwara Medical College and Hospital, Chitradurga. Patients were selected having inclusion criteria age>60 years,type of fracture – proximal femoral fractures (neck of femur, intertrochanteric, subtrochanteric fracture), patient having pathological fracture were excluded from study.

Pelvis with both hip –AP view were taken to evaluate diagnosis and classification of fracture. Routine bloodinvestigations including serum vitamin D level, serumcalcium level, serum phosphate level, serum alkaline phosphatase level, liver function test, renal function test, were carried out. Serum vitamin D level was tested with 25- hydroxy vitamin D ELISA /chemiluminescence Macro partite Enzyme Immunoassay method. Chi square test was used for analysis data and get the p value to know the significance.

Results

In our study proximal femoral fractures were more common in males and among the males, fracture neck of femur was more common than other proximal femoral fractures. Fracture neck of femur (both male and female) was more common among proximal femoral fractures.

Table 1: Relationship between sex and types of fractures.

Sex	Fracture Neck of Femur (%)	Intertrochanteric fracture (%)	Subtrochanteric fracture (%)	Total (%)
Male	42 (65.6)	21 (32.8)	1 (1.5)	64 (53.3)
Female	36 (64.3)	20 (35.7)	0	56 (46.6)
Total	78 (65)	41 (34.2)	1 (0.8)	120 (100)

84 patients out of 120 patients were having serum vitamin D Level<20 ng/ml. Type of fracture has no statistical relationship withserum vitamin D levels.

Table 2: Relationship between age and vitamin D3 level.

Age (in years)	Serum Vitamin D Levels (ng/mL)		Total
	< 20	20 - 100	
60-70	59	28	87
71-80	17	6	23
>80	8	2	10
Total	84 (70%)	36 (30%)	120 (100%)

Table 3: Relationship between serum vitamin D3 level and type of fractures.

Serum Vitamin D3 Level	Fracture Neck of	Intertrochanteric fracture	Subtrochanteric	Total (%)

(ng/mL)	Femur (%)	(%)	fracture (%)	
<20	52 (68.4)	24 (31.6)	0	76 (63.3)
20-100	26 (59.1)	17 (38.6)	1 (2.2)	44 (36.6)
Total	78 (65)	41 (34.2)	1 (0.8)	120 (100)

Proximal femoral fractures are slightly more common in patients having serum vitamin d3 level<20 ng/ml as comparedto patients having serum vitamin d3 level >20 ng/ml. Distribution of type of fracture is almost same in both the groups. Type of fracture has no significant relationship with serum Vitamin d3 levels.

Discussion

The role of vitamin D in maintaining musculoskeletal health is already evident. It does so by its role in regulation of calcium absorption, mineralization of bone and its effect on muscle function physiology [7, 8]. In our study, we studied 120 patients of proximal femoral fractures which include fracture neck of femur, intertrochanteric fractures and subtrochanteric fractures. 65% had fracture neck of femur, 34.2% had fracture intertrochanteric and 0.8% had fracture subtrochanteric. Out of those patients 53.3% patients were male and 46.6% were female, which comes to 1.14:1 of male to female ratio, study conducted by Ramalho, Lazaretti-Castro, found male female ratio for elderly patients with proximal femoral fractures to be 1:3.1 and by Bartonícek, Dzupa, Fric, 1:2.5 [9, 10]. In our study 70% of patients have serum vitamin D level <20 ng/ml and 30%have serum vitamin D level 20-100 ng/ml. In study done by Kristine, Ensrud, Brent, Taylor, Misti, Paudel, they 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. Our results are very

similar to those recently reported from an Italian study of Isaia *et al*. [11, 12] Harinarayan *et al* found 18% of patients serum vitamin D level >20 ng/ml, 52% patients have serum vitamin D level 10-20 ng/ml, and 30% patients have serum vitamin D level <10 ng/ml [13]. We did not find any difference in the 25 (OH) D levels between patients with femoral neck and trochanteric fractures, in agreement with a previously published study [14]. In contrast, a study done in Crete found that patients with trochanteric fractures had lower levels of 25 (OH) D [15].

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