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 of multiple 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 high prevalence 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

Present cross-sectional study was conducted in the Department of Orthopaedic Surgery, B. R. D. Medical College and Nehru Hospital, Gorakhpur, during the period between September 2013 and August 2016, after getting approval from research & ethical committee for the study.

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 blood investigations including serum vitamin D level, serum calcium 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 /chemiluminiscence Macroparticle 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 females 41/75 (54.6%) and among the females, fracture neck of femur 28/41 (68.2%) was more common than other proximal femoral fractures 13/41 (31.7%). Fracture neck of femur (both male and female) was more common 44/75 (58.6%) among proximal femoral fractures.

Most of the patients >70 years of age with proximal femoral fractures have serum vitamin D levels <20 ng/ml (10/12). Serum vitamin D levels have significant relationship with age.

39 patients out of 75 patients were having serum vitamin D Level<20 ng/ml, but patients having >20 ng/ml were (36/75). Type of fracture has no statistical relationship with serum vitamin D levels.

### Table 1: Relationship between sex and types of fractures.

<table>
<thead>
<tr>
<th>Sex</th>
<th>Fracture neck of femur N (%)</th>
<th>Intertrochanteric fracture N (%)</th>
<th>Subtrochanteric fracture N (%)</th>
<th>Total N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>16 (47.05)</td>
<td>17 (50)</td>
<td>01 (2.94)</td>
<td>34 (45.34)</td>
</tr>
<tr>
<td>Female</td>
<td>28 (68.29)</td>
<td>11 (26.82)</td>
<td>02 (4.87)</td>
<td>41 (54.67)</td>
</tr>
<tr>
<td>Total</td>
<td>44</td>
<td>28</td>
<td>03</td>
<td>75</td>
</tr>
</tbody>
</table>

### Table 2: Relationship between age and vitamin D3 level.

<table>
<thead>
<tr>
<th>Age (in years)</th>
<th>Serum vitamin D3 level (ng/ml)</th>
<th>Total N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;20</td>
<td>20-100</td>
</tr>
<tr>
<td>60-70</td>
<td>29</td>
<td>29</td>
</tr>
<tr>
<td>71-80</td>
<td>07</td>
<td>02</td>
</tr>
<tr>
<td>&gt;80</td>
<td>03</td>
<td>00</td>
</tr>
<tr>
<td>Total</td>
<td>39</td>
<td>31</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Serum vitamin D3 level (ng/ml)</th>
<th>Fracture neck of femur N (%)</th>
<th>Intertrochanteric fracture N (%)</th>
<th>Subtrochanteric fracture N (%)</th>
<th>Total N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;20</td>
<td>24</td>
<td>15</td>
<td>00</td>
<td>39 (52)</td>
</tr>
<tr>
<td>20-100</td>
<td>18</td>
<td>11</td>
<td>03</td>
<td>32 (42.67)</td>
</tr>
<tr>
<td>&gt;100</td>
<td>02</td>
<td>02</td>
<td>00</td>
<td>04 (5.33)</td>
</tr>
<tr>
<td>Total</td>
<td>44</td>
<td>28</td>
<td>03</td>
<td>75</td>
</tr>
</tbody>
</table>

Proximal femoral fractures are slightly more common in patients having serum vitamin d3 level<20 ng/ml (39/75) as compared to patients having serum vitamin d3 level >20 ng/ml (36/75). Distribution of type of fracture is
almost same in both the groups. Type of fracture has no significant relationship with serum Vitamin d3 levels(X2=1.025, df=2, p>0.05).

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, I have studied 75 patients of proximal femoral fractures which include fracture neck of femur, intertrochanteric fractures and subtrochanteric fractures. 58.67% had fracture neck of femur, 34.67% had fracture intertrochanteric and 6.67% had fracture subtrochanteric. Out of those patients 45.34% patients were male and 54.67% were female, which comes to 1:1.2 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, Fríc, 1:2.5.9,10

In my study 52% of patients have serum vitamin D level <20 ng/ml, 42% have serum vitamin D level 20-100 ng/ml, and 6% have serum vitamin D level>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 367 (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

CONCLUSION

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.

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Conflict of interest: None declared
Ethical approval: The study was approved by the institutional ethics committee

REFERENCES

