IJPSR (2026), Volume 17, Issue 1 (Research Article)

INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES AND RESEARCH

Received on 29 November 2025; received in revised form, 08 December 2025; accepted, 25 December 2025; published 01 January 2026

PREVALENCE OF VITAMIN D DEFICIENCY IN ELDERLY PATIENTS PRESENTING WITH FRACTURES IN A TERTIARY CARE SETUP OF ASSAM: A CROSS-SECTIONAL STUDY

Bikash Agarwal [*1], Rajarshi Roy [1] and Saiful Islam [2]

Dhubri Medical College and Hospital [1], Dhubri - 783325, Assam, India.
Fakhruddin Ali Ahmed Medical College [2], Barpeta - 781314, Assam, India.

Keywords:

Elderly, Fractures, Vitamin D, Northeast India

Correspondence to Author:
Dr. Bikash Agarwal

Research Scholar,
Dhubri Medical College and Hospital,
Dhubri - 783325, Assam, India.

E-mail: bikash001@gmail.com

ABSTRACT: Vitamin D deficiency can lead to osteoporosis and increase risk of fracture. We tried to determine prevalence of Vitamin D deficiency in elderly population of Northeast India presenting with fracture and formulate some preventive measures especially in elderly patients. Elderly patients, more than 60 yrs of age, presenting with some sort of fractures, were subjected to predetermined Questionnaire and response was noted. Estimation of serum Vitamin D3 levels and serum calcium were done. A total of 60 patients were evaluated, 36 females and 24 males. In the present study 51.66% patients had Vitamin D deficiency, and 30% patients had Vitamin D insufficiency. A total of 81.66% patients (49) had deficient or insufficient Vitamin D levels in their blood and the result was significant. Most patients had fracture distal end radius, followed by vertebral fractures, fracture neck femur and inter trochanteric fractures. From this study, it can be concluded that Vitamin D deficiency is highly prevalent in elderly patients with fracture in our region. Timely diagnosis and supplementation of Vitamin D can go a long way in preventing these fractures.

INTRODUCTION: Vitamin D deficiency can lead to osteoporosis and increase risk of fracture [1]. Fractures in elderly population is a low energy fracture which appears when the bone structure under specific loading conditions undergoes biomechanical failure as it is unable to withstand the force received, by having its resistance capacity degraded. Among the factors that are related to genesis of this bone deterioration Vitamin D stands out in a relevant way [2]. Vitamin D deficiency causes secondary hyperparathyroidism that leads to persistent increase in PTH leading to bone resorption.

QUICK RESPONSE CODE

DOI: 10.13040/IJPSR.0975-8232.17(1).403-07

This article can be accessed online on www.ijpsr.com

DOI link: https://doi.org/10.13040/IJPSR.0975-8232.17(1).403-07

It is also associated with decreased tone and neuromuscular control due to presence of receptors in skeletal muscles. Vitamin D also has important role in other metabolic process like calcium and phosphate homeostasis. Hence, there is a progressive decrease in bone formation and increase risk of fall, both leading to increased risks of fractures [2, 3, 4, 5].

It has been estimated that 1 billion people have Vitamin D deficiency or insufficiency worldwide [3]. Growing evidence has shown that Vitamin D insufficiency is highly prevalent in Asian population [6]. However, there is lack of data availability on prevalence of Vitamin D deficiency in elderly patients with fracture from the north-eastern region of India. This study has been undertaken to determine prevalence of Vitamin D deficiency especially in elderly population of our area. The idea is to formulate some preventive measures which could be easily implemented to

overcome the problem of this deficiency in our region mainly in elderly group of people.

MATERIAL AND METHODS: Elderly patients, more than 60 yrs of age, presenting with fracture, to a tertiary care facility in Northeast India who consent to participate in the study were included in the study.

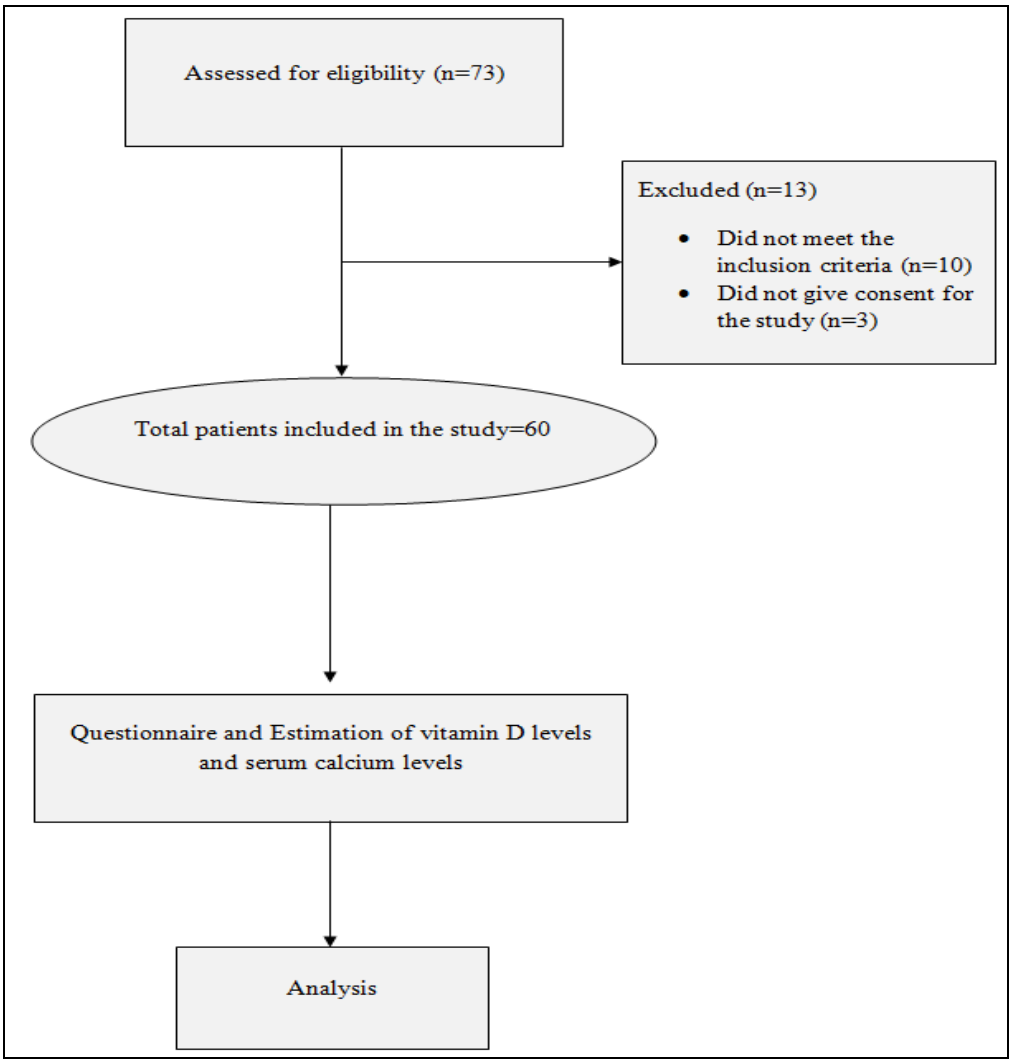
However, those patients who had suspicion of Pathological fracture, and also those receiving Vitamin D supplementation, drug for osteoporosis, steroids, anti-epileptic drug, diuretics, heparin, thyroid hormone supplementation, progestins were excluded from the study.

The patients were subjected to predetermined Questionnaire and response was noted followed by estimation of serum Vitamin D3 levels and serum calcium. The dietary habits of the patients were defined as Vegetarian if the patient is on pure non animal diet, however milk or milk product use was also considered as vegetarian. The diet was considered as mixed is patient takes animal product like egg or meat in their diet.

The Sun exposure was termed as adequate if patient had an exposure of sunlight for a minimum period of 10 min per day, 2-3 times a week, to hand, arm and face without sunscreen [14].

There is no consensus on optimal levels of Vitamin D measured in serum. Most experts define Vitamin D deficiency as serum level of Vitamin D less than 20 ng/mL, insufficiency as 21-29 ng/mL and a level 30 ng/mL or more as sufficient Vitamin D level. In our study we have taken these reference values for all our calculations.

A total of sixty (60) patients fitted to our criteria and results were calculated using the data of these patients followed by suitable statistical analysis using P value <0.05 as significant, and Chi square test where relevant.



RESULTS: Total numbers of patient included in the study were 60(sixty). 60% of the patient (36) were female and 40% were male (24). Most of the study subjects that is 33 (55%) were in the age group 60-64 years. 20 patients (33.33%) were in the age group 65-69 years. 7 patients(11.67%) were in the age group 70 years or more. The mean age was 63.4±4.1 years. Out of 36 female patients with fracture who attained menopause 1(2.77%) had duration of menopause of ≤6 years, 9(25%) had duration of menopause of 7-12 years, 20(55.56%) had duration of menopause of 13-18 years, 4(11.11%) had duration of menopause of 19-24 years and 2(3.64%) had duration of menopause of ≥25 years. 22 patients were using tobacco, 28 patients were using alcohol around more than 100 ml per week, 18 patients had hypertension, 25 patients had diabetes mellitus, 3 patients had cerebro-vascular accident while 2 patients had history of cardiac event but minor. 20 patients had none of the above risk factors. We tried to corroborate our finding of Vitamin D deficiency with co-morbities. Our study suggest that most patient with Vitamin D deficiency has sedentary life style which could also lead to co-morbid diseases and because of the co morbidities, the patient has limited himself/herself confined to home. In both the cases, the sunlight exposure decreases significantly. When we tried to get an idea about sun exposure from the questionaire and most patients had inadequate sun exposure.

Out of 60 elderly patients with fractures in the present study 31(51.66%) patients had Vitamin D deficiency, 18(30%) patients had Vitamin D insufficiency, and 11(18.33%) patients had sufficient levels of Vitamin D. When we had a look at the Vitamin D of the patients with fractures 81.66% patients (49) had below sufficient Vitamin D levels in their blood and the result was significant (p=.0012). **Table 1** shows the levels of Vitamin D in patients.

10 % patients were on vegetarian diet. When we tried to corroborate our findings with dietary habits, it was found that there was no significant relationship between diet and Vitamin D levels in our elderly subjects with fracture, with Chi square= 2.751 and p-value = 0.252706 as shown in **Table 2.**

TABLE 1: DISTRIBUTION OF VITAMIN D STATUS IN THE SUBJECTS WITH FRACTURES

Vitamin D status	Number of patients	Percentage
Deficient (<20ng/mL)	31	51.66
Insufficient (20-30ng/mL)	18	30
Sufficient (>30ng/mL)	11	18.33

TABLE 2: DISTRIBUTION OF VITAMIN D STATUS IN SUBJECTS WITH FRACTURES ACCORDING TO DIET

Vitamin D status	No. of patients with fragility fractures according to diet		Total
	Vegetarian diet	Mixed diet	
Deficient	4(66.66%)	27(50%)	31
Insufficient	1(16.66%)	17(31.48%)	18
Sufficient	1(16.66%)	10(18.52%)	11

TABLE 3: DISTRIBUTION OF FRACTURES ACCORDING TO ANATOMICAL SITE

Types of fracture	Frequency	Percentage
Distal end of Radius	28	46.67
Vertebra	12	20
Neck of Femur	15	25
Intertrochanteric	8	13.33

3 NOS Patients Had Two of the Above Fractures: On evaluating the types of fractures in our patients, we found that most patients had fracture Distal end radius (46.67%). 3 patients had combination of fractures like fracture neck femur and distal end femur fracture in 2 patients and intertrochanteric fractures and fracture distal end radius in one. The detail distribution is shown in **Table 3.** Most of the patients with fracture distal end radius and fracture neck femur had deficient Vitamin D levels.

DISCUSSION: Fractures in elderly usually occurs from low energy trauma, WHO defined this low energy trauma as fall from standing height or less [7]. Fractures in elderly are a major health problem globally with high morbidity, mortality, socioeconomic impact and health costs. 1 in 3 women and 1 in 5 men over the age of 50 years experience osteoporotic fragility fractures worldwide [8, 9, 10, 11]. Among the causes of fracture in elderly, osteoporosis is the most common cause [12]. Vitamin D is a seco-steroid that plays a critical

role in calcium and phosphate homeostasis [13]. Vitamin D deficiency leads to reduction in bone mineral density and increases risk of bone fractures in elderly people [3]. Studies have shown that lower level of Vitamin D is associated with increased risk of falls and fractures [3, 15].

In the present study, the mean age was 63.4±4.1 years with a range from 60 years to 90 years. Most of the study subjects were between the age group 60-64 years (55%) followed by 65-69 years (33.33%). The findings of the present study are similar to the findings of Ankit Dadra *et al.* [16], Rajesh Khadgawat *et al.* [17], E.P. Boschitsch *et al.*[18], where the maximum occurrence of fragility fractures was found to be 64.1±13.8 years, 62±12.3 years and 65.4 years respectively. However, the findings of our study differ from the findings of the study by Rajesh Kumar *et al.* [19] where it was 75.9±4.6 years. Most of the study subjects were from lower socioeconomic status and majority of them were from tea garden communities where the behavioural risk factors like smoking and alcoholism are common. Saskia L. Wilson-Banes *et al.* [20] reported that Smoking can cause low BMD. Toxic substances found in tobacco like nicotine causes ineffective absorption and utilization of nutrients such as protein and calcium. These substances can also increase acidity of blood, which can thereby promote further bone turnover.

Chronic alcohol intake can have significantly detrimental effects on bone mass accrual and structure along with impaired Liver functions, which might lead to insufficient level of Vitamin D conversion. Alcohol intake may impair osteoblastic function. Garu A *et al.* [21] in their study reported that comorbidities like diabetes mellitus, cardiovascular disease, peripheral artery disease, and abdominal calcification are associated with a 2 to 5-fold increased risk of hip fractures. Though the patient in our study was having some comorbidities, yet the fractures cannot be completely attributed to the comorbidities. Out of 60 elderly patients with fractures in the present study 31(51.66%) patients had Vitamin D deficiency, 18(30%) patients had Vitamin D insufficiency and 11(18.33%) patients had sufficient levels of Vitamin D. The results of the present study is similar to the study of such at Phusunti MD *et al.*[22] reported a prevalence of Vitamin D deficiency in 46.3% of patients with a fragility fracture in Thailand and Bogunovic *et al.*[23] who reported 40% Vitamin D deficiency in patients with fragility fracture.

However finding of the present study is much lesser than the finding of Saini *et al.* [24], Ankit Dadra *et al.*[16], G.S. Maier *et al.*[25], and Rajesh Khadgawat *et al.*[17] where they found prevalence of Vitamin D deficiency 76%, 74.2%, 89% and 96.7% respectively. The reason for this may be the exclusion criteria of the present study where patients with renal and liver disease were excluded which is one of the most important causes of Vitamin D deficiency. Another reason could be geographical variation, food habit of the present study population mostly taking fish and meat in their regular diet which is rich in Vitamin D.

Significant number of patients with fracture had low level of Vitamin D, below sufficient levels and the most common site of fracture was distal end radius fracture. Most of the patients with fracture distal end radius and fracture neck femur in our study had deficient Vitamin D levels.

CONCLUSION: From this study, it can be concluded that Vitamin D deficiency is highly prevalent (51.66%) in elderly patients with fracture in our region. Also Vitamin D deficiency seems to have a significant role in elderly patients having fractures especially fracture of distal end radius and fracture neck of femur. Since, the deficiency is easily correctable with oral supplementation of Vitamin D, measures for early diagnosis through mass screening tests and proper Vitamin D supplementation are highly recommended in preventing fractures in elderly patients.

ACKNOWLEDGEMENT: We would like to thank the Almighty, our institutional ethics committee, our patients, nursing staff, and all the support staff of our institution, without which the study would not have been possible. A special acknowledgement of the Department of Pathology of our institution who have helped us a lot in Vitamon D estimation.

CONFLICTS OF INTEREST: Nil

REFERENCES:

1. Wang Q, Yu D, Wang J and Lin S: Association between Vitamin D deficiency and fragility fractures in Chinese

elderly patients: a cross-sectional study. Ann Palliat Med 2020; 9(4): 1660-1665.
2. Mesa Ramos M: Vitamin D and fragility fractures. Rev Osteoporos Metab Miner 2017; 9 (1): 40-44.
3. Holick MF: Vitamin D deficiency. N Engl J Med 2007; 357(3): 266-81.
4. Mezquita-Raya P, Muñoz-Torres M and Luna JD: Relation between Vitamin D insufficiency, bone density, and bone metabolism in healthy postmenopausal women. J Bone Miner Res 2001; 16(8): 1408-15.
5. Hilger J, Friedel A, Herr R and Rausch T: A systematic review of Vitamin D status in populations worldwide. Br J Nutr 2014; 111(1): 23-45.
6. Lowe NM and Bhojani I: Special considerations for Vitamin D in the south Asian population in the UK. Ther Adv Musculoskelet Dis 2017; 9: 137-44.
7. Kanis JA: The burden of osteoporotic fractures: a method for setting intervention thresholds. Osteoporos Int 2001; 12(5): 417–427
8. Kanis JA: Long-term risk of osteoporotic fracture in Malmo. Osteoporos Int 2000; 11(8): 669-74.
9. Melton LJ: Bone density and fracture risk in men. J Bone Miner Res 1998; 13(12): 1915-23.
10. Melton LJ: Perspective. How many women have osteoporosis? J Bone Miner Res 1992; 7(9): 1005-10.
11. Curtis EM: Epidemiology of fractures in the United Kingdom 1988-2012: Variation with age, sex, geography, ethnicity and socioeconomic status. Bone 2016; 87: 19-26.
12. Fragility fracture- UT Southwestern medical centre
13. Heaney RP, Gallagher JC and Johnston CC: Calcium nutrition and bone health in the elderly. Am J Clin Nutr 1982; 36(5): 986–1013.
14. Michael FH: Sunlight and vitamin D for bone health and prevention of autoimmune diseases, cancers, and cardiovascular disease. The Am J of Clin Nutri 2004; 80(6): 1678S-1688S.
15. Yao P, Sun L and Lu L: Effects of genetic and nongenetic factors on totaland bioavailable 25(OH)D responses to Vitamin D supplementation.. J Clin Endocrinol Metab 2017; 102(1): 100–10.
16. Dadra A, Aggarwal S, Kumar P, Kumar V, Dibar DP and Bhadada SK: High prevalence of Vitamin D deficiency and osteoporosis in patients with fragility fractures of hip: A pilot study. J Clin Orthop Trauma 2019; 10(6): 1097-1100
17. Khadgawat R, Brar KS, Gahlo M, Yadav CS, Malhotra R, Guptat N and Tandon N: High prevalence of Vitamin D deficiency in Asian-Indian patients with fragility hip fracture: a pilot study. J Assoc Physicians India 2010; 58: 539-42. Erratum in: J Assoc Physicians India 2010; 58: 630. Brar, Kiraninder Singh [corrected to Brar, Krishnendra Singh].
18. Boschitsch EP, Durchschlag E and Dimai HP: Age-related prevalence of osteoporosis and fragility fractures: real-world data from an Austrian Menopause and Osteoporosis Clinic. Climacteric 2017; 20(2): 157-163.
19. Kumar SR, Sreenivas S and Kasturi A: Association of calcium and Vitamin D levels in fragility fractures in the elderly: A study in a tertiary care centre. IP Int J Orthop Rheumatol 2020; 6(1): 26.
20. Wilson-Barnes SL, Lanham-New SA and Lambert H: Modifiable risk factors for bone health & fragility fractures. Best Pract Res Clin Rheumatol 2022; 101758.
21. A G, Yano S, Sheik AM, Yu A and Okuyama K: Effect of Multimorbidity on Fragility Fractures in Community-Dwelling Older Adults: Shimane CoHRE Study. J Clin Med 2021; 10(15): 3225.
22. Montoya-García MJ, Giner M, Marcos R and García-Romero D: Fragility fractures and imminent fracture risk in the spanish population: a retrospective observational cohort study. J Clin Med 2021; 10(5): 1082.
23. Bogunovic L, Kim AD, Beamer BS, Nguyen J and Lane JM: HypoVitaminosis D in patients scheduled to undergo orthopaedic surgery: a single-center analysis. J Bone Joint Surg Am 2010; 92(13): 2300-4.
24. Dash SK, Panigrahi R, Palo N, Priyadarshi A and Biswal M: Fragility Hip Fractures in Elderly Patients in Bhubaneswar, India (2012-2014): A Prospective Multicenter Study of 1031 Elderly Patients. Geriatr Orthop Surg Rehabil 2015; 6(1): 11-5.
25. Maier GS, Seeger JB, Horas K, Roth KE, Kurth AA and Maus U: The prevalence of Vitamin D deficiency in patients with vertebral fragility fractures. Bone Joint J 2015; 97(1): 89-93.

How to cite this article:
Agarwal B, Roy R and Islam S: Prevalence of vitamin d deficiency in elderly patients presenting with fractures in a tertiary care setup of Assam: a cross sectional study. Int J Pharm Sci & Res 2026; 17(1): 403-07. doi: 10.13040/IJPSR.0975-8232.17(1).403-07.