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Original Research Article

FREQUENCY OF VITAMIN D DEFICIENCY IN PATIENTS WITH LOW ENERGY HIP FRACTURE PRESENTING TO ORTHOPEDIC DEPARTMENT OF LADY READING HOSPITAL PESHAWAR

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ABSTRACT

Background: *Vitamin D plays a critical role in bone health, and its deficiency has been associated with increased risk of fragility fractures. Low-energy hip fractures are common in the elderly and often indicate underlying metabolic bone disease. Understanding the prevalence of vitamin D deficiency in this population can guide preventive and therapeutic strategies.* ***Objective:*** *To determine the frequency of vitamin D deficiency in patients with low-energy hip fractures presenting to the Orthopedic Department of Lady Reading Hospital, Peshawar.* ***Study Design:*** *Descriptive cross-sectional study.* ***Setting:*** *Orthopedic Department, Lady Reading Hospital, Peshawar, Pakistan.* ***Duration of Study:*** *Six months (27-May-2024 to 27-November-2024).* ***Methods:*** *A total of 95 patients aged above 50 years, diagnosed with low-energy hip fractures, were included in the study. Patients with pathological fractures, high-energy trauma, or prior vitamin D supplementation were excluded. A 5-cc venous blood sample was collected from each participant to measure serum vitamin D levels using standard laboratory methods. Vitamin D deficiency was defined as a serum 25-hydroxyvitamin D level <20 ng/mL. Data were analyzed using SPSS version 25. Descriptive statistics were used to calculate means and standard deviations for continuous variables, and frequencies and percentages for categorical variables.* ***Results:*** *The mean age of participants was 68.11 ± 10.38 years, with females comprising 61.1% of the study population. The mean serum vitamin D level was 19.35 ± 3.49 ng/mL. Vitamin D deficiency was observed in 74.7% of patients with low-energy hip fractures.* ***Conclusion:*** *This study demonstrated a high prevalence of vitamin D deficiency among patients with low-energy hip fractures. Routine screening and appropriate supplementation strategies should be considered to reduce the risk of fractures and improve bone health in this high-risk population.*

Keywords: Vitamin D Deficiency, Low-Energy Hip Fractures, Elderly Patients

INTRODUCTION

Hip fracture, along with neck of femur fracture, has synonymous terms. The terms referred to a fracture of the proximal femur taking place between the femoral head and 5 cm distal to the lesser trochanter. Most hip fractures develop due to falls among the elderly population. Numerous risk factors for falls exist within the elderly population, with an independent association recognized for previous instances of falls, use of walking aids, and antiepileptic drugs. Numerous patients present with several risk factors, and a combination of these variables with age-related declines in bone quality makes up the primary cause of the majority of hip fractures (1-3). Approximately 5% of hip fractures occur without previous evidence of trauma, necessitating the consideration of alternative causes in these instances. The annual incidence per 100,000 in the U.S. is projected to vary for men and women. The incidence of hip fractures increases with age (4, 5). The vast majority of hip fractures are identifiable via plain film radiographs. Anteroposterior and lateral views of the pelvis, as well as the affected hip, should be acquired. Occult fractures, which are not identifiable via X-ray, represent nearly 10% of hip fractures (6).

Vitamin D acts as a fat-soluble secosteroid hormone alongside pleiotropic effects that occur naturally in specific conditions. Vitamin D3 is mainly found in the fat of sea fish as well as cod liver oil, while D2 is found mainly in mushrooms as well as plants (7). Vitamin D3 is predominantly synthesized in skin from 7-dehydrocholesterol on exposure to daylight, particularly ultraviolet B radiation.[7] Inadequate vitamin D levels disrupt the balance between osteogenesis and bone remodeling, leading to rickets in children and osteoporosis in older adults (3). Vitamin D deficiency (VDD) has been associated with severe muscle weakness, which could raise the risk of falls and prevalence of fractures (8-11).

The rationale of this study is to determine the frequency of VDD in patients with low-energy hip fractures in the Asian population and compare the results with published literature in the Western population, keeping in mind cultural and lifestyle differences in Eastern and Western civilizations. This will enable us to obtain an informed opinion on the actual rate of VDD in our elderly population, helping us address the problem, decrease the incidence of low-energy hip fractures, and improve the quality of life of elderly patients.

METHODOLOGY

This cross-sectional research was conducted at the orthopedic department of Lady Reading Hospital, Peshawar, from 27 May 2024 to 27 November 2024 after receiving ethical approval from the hospital's review board. The study enrolled ninety-five patients aged > 50 years of both genders who were diagnosed with low-energy hip fractures, specifically those resulting from falls at standing height or less. Patients with metastatic bone tumors, metabolic bone diseases other than osteoporosis, or fractures caused by high-energy injuries were not included. The sample was selected based on the previous frequency of VDD 80.3% (11), a margin of error of 8%, and a confidence interval of 95%. Non-probability consecutive sampling was applied.

All the patients gave their consent. Demographic and clinical data were gathered from each patient. A venous blood sample of 5 cc was collected from each patient under aseptic conditions and sent to the hospital laboratory for the measurement of serum vitamin D levels; levels less than 20 ng/ml were labelled as deficient.

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The data collected were entered into a pre-designed proforma and were analyzed with SPSS 25.0. Age, duration of the fracture, and vitamin D levels were measured using mean and SD. Gender, smoking, hypertension, profession, educational level, residence, socioeconomic status, diabetes, obesity, and VDD were assessed using frequency and percentages. Stratifications were done for demographic variables and comorbidities using the Chi-Square test, with a P value <0.05 considered significant.

RESULTS

The mean age of 95 patients was 68.11±10.38 years. The duration of fractures was 4.92±1.37 days. The mean vitamin D level was 19.35±3.49 ng/ml. Thirty-seven (38.9%) patients were male, and 58 (61.1%) were female (Table 1). Regarding comorbidities, 14 (14.7%) patients had hypertension, and 18 (18.9%) had diabetes, while 10 (10.5%) had both hypertension and diabetes (Table 2). Vitamin D deficiency was highly prevalent, with 71 (74.7%) patients being deficient, while 24 (25.3%) had normal vitamin D levels (Table 3). Table 4 presents the stratification of vitamin D deficiency with various demographic parameters and comorbidities.

Table 1: Demographics

Demographics		n	%
Gender	Male	37	38.9%
	Female	58	61.1%
Literacy	Illiterate	67	70.5%
	Primary	20	21.1%
	Secondary	8	8.4%
	Matric and above	0	0.0%
Smoking	Yes	3	3.2%
	No	92	96.8%
Obesity	Yes	12	12.6%
	No	83	87.4%
Residence	Urban	0	0.0%
	Rural	95	100.0%
Profession	Job	3	3.2%
	Business	0	0.0%
	Unemployed	92	96.8%
Socioeconomic status	Low	31	32.6%
	Middle	50	52.6%
	high	14	14.7%

Table 2: Comorbidities

Comorbidities	n	%
Hypertension	14	14.7%
Diabetes	18	18.9%
Both	10	10.5%
None	53	55.8%

Table 3: Vitamin D deficiency

Vitamin D deficiency	n	%
Yes	71	74.7%
No	24	25.3%

Table 4: Stratification of VDD with various demographic parameters and comorbidities

		Vitamin D deficiency				P value
		Yes		No		
		n	%	n	%	
Age	50-60	15	21.1%	10	41.7%	P > 0.05
	61-70	29	40.8%	3	12.5%	
	71-80	19	26.8%	8	33.3%	
	81-90	7	9.9%	2	8.3%	
	91-100	1	1.4%	1	4.2%	
Gender	Male	28	39.4%	9	37.5%	P > 0.05
	Female	43	60.6%	15	62.5%	
Comorbidities	Hypertension	8	11.3%	6	25.0%	P > 0.05
	Diabetes	17	23.9%	1	4.2%	
	Both	8	11.3%	2	8.3%	
	None	38	53.5%	15	62.5%	
Literacy	Illiterate	50	70.4%	17	70.8%	P > 0.05
	Primary	16	22.5%	4	16.7%	
	Secondary	5	7.0%	3	12.5%	
	Matric and above	0	0.0%	0	0.0%	
Smoking	Yes	2	2.8%	1	4.2%	P > 0.05
	No	69	97.2%	23	95.8%	
Obesity	Yes	9	12.7%	3	12.5%	P > 0.05
	No	62	87.3%	21	87.5%	
Residence	Urban	0	0.0%	0	0.0%	Not applicable
	Rural	71	100.0%	24	100.0%	
Profession	Job	3	4.2%	0	0.0%	P > 0.05
	Business	0	0.0%	0	0.0%	
	Unemployed	68	95.8%	24	100.0%	
Socioeconomic	Low	25	35.2%	6	25.0%	P > 0.05
	Middle	37	52.1%	13	54.2%	
	High	9	12.7%	5	20.8%	
Duration of fracture (Days)	2 to 5	49	69.0%	13	54.2%	P > 0.05
	>5	22	31.0%	11	45.8%	

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DISCUSSION

In our study, the mean age was 68.11±10.38 years, with a significant portion of the patients presenting with low serum vitamin D levels. VDD was found in 74.7% of the study participants, which is consistent with other studies that highlight the high prevalence of deficiency in elderly fracture patients. The study by Han et al. from Korea also affirms our findings, particularly regarding the impact of VDD on bone health in elderly patients with low-energy hip fractures. Their study, which reported a deficiency in 83.2% of their sample, found that vitamin D deficiency is a major risk factor for fragility fractures (11). Similar to our findings, Han et al. noted that vitamin D levels were not significantly lower in elderly fracture patients, reinforcing the role of vitamin D in bone mineralization and fracture prevention.

A study conducted by Aljebreen et al. assessed the prevalence of VDD in high and low energy fracture patients; they reported that the prevalence of VDD 62%, which is comparable to our findings (12).

Guerra et al. investigated the role of low vitamin D levels in the mortality risk of post-hip fracture in older adults. They found that the vitamin D levels below 12.5 ng/mL potentially increased the risk of mortality (13). Our study, which focused on low-energy hip fracture occurrence and not directly on mortality, echoes these concerns as vitamin D deficiency can impair bone health and slow recovery. The average vitamin D levels in our participants were 19.36±3.49 ng/mL, which is slightly higher than the critical threshold noted in the study above. However, the higher percentage of deficiency in our cohort remains a cause for concern, particularly given the known link of low vitamin D with slower recovery post-fracture.

Dadra et al. focused their study on osteoporosis patients presented with fragility fractures of the hip, underscoring the connection between vitamin D deficiency and the prevalence of osteoporosis in patients with hip fractures. They found that osteoporosis was prevalent in 62.1% of their cohort, with a strong relation between bone mineral density and lower levels of vitamin D. They reported that VDD was observed in around 74.2% patients. Our study did not measure bone mineral density, but the high prevalence of obesity (12.6%) and the fact that 55.8% of participants had no comorbidities suggest that other health factors, including nutrition and physical activity, might also play a role in fracture risk, as observed in Dadra et al.'s research (14). Although we did not assess the etiology of hip fractures among our patients, the study above showed that most of their patients had fractures due to falling in the washroom or due to a fall on slippery wet floors, which are major concerns in adults over 60 years.

CONCLUSION

In conclusion, our study demonstrated a higher prevalence of vitamin D deficiency (74.7%) among patients with low-energy hip fractures. This highlights the critical role of vitamin D supplements in bone health.

DECLARATIONS

Data Availability Statement

All data generated or analysed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department Concerned. (IRB-139/LRH/MTI)

Consent for publication

Approved

Funding

Not applicable

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTION

SAQIB UR REHMAN (PGR Orthopedics***)***
Conception of Study, Data Collection, Entry, Analysis, Review of manuscript, Manuscript drafting, and Final Approval of Draft
SYED IMRAN BUKHARI (Associate Professor Orthopedics***)***
Critical input, Research Methadology, and Final Approval of Draft
ZUBAIR KHAN (PGR Orthopedics***)***
Critical Input
SYED HASEEB ULLAH SHAH (PGR Orthopedics***)***
Reviw of Literature.

REFERENCES

1. Yawar B, Auld C, Salmon J, Yawar A, Khan MN, Abdulrahman H, Sapumohotti A, Duffy E, Meehan S, McSorley A, Neely C. Mortality in hip fracture patients during the COVID-19 pandemic: a retrospective analysis in a district general hospital in the United Kingdom. Cureus. 2022 Aug 7;14(8):e27747. https://doi.org/10.7759/cureus.27747
2. Berry SD, Kiel DP, Colón-Emeric C. Hip fractures in older adults in 2019. JAMA. 2019;321(22):2231-2232. https://doi.org/10.1001/jama.2019.5453
3. Deandrea S, Lucenteforte E, Bravi F, Foschi R, La Vecchia C, Negri E. Risk factors for falls in community-dwelling older people: a systematic review and meta-analysis. Epidemiology. 2010;21(5):658-668. https://doi.org/10.1097/EDE.0b013e3181e89905
4. Parker M, Johansen A. Hip fracture. BMJ. 2006;333(7557):27-30. https://doi.org/10.1136/bmj.333.7557.27
5. Dhanwal DK, Dennison EM, Harvey NC, Cooper C. Epidemiology of hip fracture: worldwide geographic variation. Indian J Orthop. 2011;45(1):15-22. https://doi.org/10.4103/0019-5413.73656
6. Deleanu B, Prejbeanu R, Tsiridis E, Vermesan D, Crisan D, Haragus H, et al. Occult fractures of the proximal femur: imaging diagnosis and management of 82 cases in a regional trauma center. World J Emerg Surg. 2015;10:55. https://doi.org/10.1186/s13017-015-0049-y
7. Andrade JM, Grandoff PG, Schneider ST. Vitamin D intake and factors associated with self-reported vitamin D deficiency among US adults: a 2021 cross-sectional study. Front Nutr. 2022;9:899300. https://doi.org/10.3389/fnut.2022.899300
8. Bischoff-Ferrari HA, Dawson-Hughes B, Staehelin HB, Orav JE, Stuck AE, Theiler R, et al. Fall prevention with supplemental and active forms of vitamin D: a meta-analysis of randomised controlled trials. BMJ. 2009;339:b3692. https://doi.org/10.1136/bmj.b3692
9. Bischoff-Ferrari HA, Willett WC, Wong JB, Giovannucci E, Dietrich T, Dawson-Hughes B. Fracture prevention with vitamin D supplementation: a meta-analysis of randomized controlled trials. JAMA. 2005;293(18):2257-2264. https://doi.org/10.1001/jama.293.18.2257
10. Habibi Ghahfarrokhi S, Mohammadian-Hafshejani A, Sherwin CM, Heidari-Soureshjani S. Relationship between serum

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vitamin D and hip fracture in older people: a systematic review and meta-analysis. J Bone Miner Res. 2022;40(4):541-553. https://doi.org/10.1007/s00774-022-01333-7
11. Han J, Cho Y, Jee S, Jo S. Vitamin D levels in patients with low-energy hip fractures. Hip Pelvis. 2020;32(4):192-198. https://doi.org/10.5371/hp.2020.32.4.192
12. Aljebreen MA, Alshehri A, Almunif A, Al-Suhaimi R, Almutairi F, Alkenani NS. Association between vitamin D deficiency and high or low energy fractures among patients above 45 years old in Riyadh. Int J Med Res Health Sci. 2020;9(1):67-71. Guerra MT, Wagner M, Vargas A, Galia CR. Low serum levels of vitamin D significantly increase the risk of death in older adults with hip fractures: a prospective cohort. Rev Col Bras Cir. 2022;49:e20223054. https://doi.org/10.1590/0100-6991e-20223054
13. Dadra A, Aggarwal S, Kumar P, Kumar V, Dibar DP, 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. https://doi.org/10.1016/j.jcot.2019.03.012

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