

Prevalence of Vitamin D Deficiency in Patients Undergoing Routine Check-ups

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Abstract

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Background: Vitamin D is essential for bone and muscle health. Deficiency is common worldwide and often asymptomatic. This study evaluates the prevalence of Vitamin D deficiency and the proportion of symptomatic cases in patients undergoing routine health check-ups.

Methods: A retrospective analysis of 646 patients attending routine check-ups over six months was conducted. Serum vitamin D levels were measured. Patients with Vitamin D <20 ng/ml were classified as deficient. Symptomatic cases were identified based on musculoskeletal complaints.

Results: Among 646 patients undergoing routine check-ups (146 males, 500 females; age 19-87 years), 313 (48.5%) had vitamin D deficiency. Of these, 85 (27.2%) were symptomatic. Overall, symptomatic vitamin D deficiency was present in 13.2% of all patients.

Conclusion: Vitamin D deficiency is prevalent in the study population undergoing routine health evaluation. A substantial proportion is asymptomatic, highlighting the importance of screening and preventive strategies.

Keywords: Vitamin D deficiency, Asymptomatic prevalence, Routine health check-up

Introduction

Vitamin D is an essential fat-soluble vitamin that plays a vital role in calcium homeostasis, bone metabolism, and muscle function. Deficiency has been associated with various musculoskeletal and non-skeletal symptoms like osteomalacia, osteoporosis, increased fall risk, and musculoskeletal pain, often even in the absence of overt symptoms.¹ Vitamin D deficiency is defined as serum vitamin D level <20 ng/ml, insufficiency as vitamin D level 21-29 ng/ml, and sufficient as vitamin D level 30 - 100 ng/ml.²⁻⁵

Globally, vitamin D sufficiency affects nearly half of the population, influenced by limited sun exposure, dietary intake, and lifestyle factors.⁶⁻¹⁰ Patients presenting with

musculoskeletal complaints such as bone pain, muscle weakness, or fatigue were considered symptomatic. But more importantly, many individuals with deficiency remain asymptomatic until complications such as osteomalacia, osteoporosis, or fragility fracture occur, leading to underdiagnosis and delayed treatment.^{1,11} So, screening and supplementation are important, even for asymptomatic individuals, to prevent long term complications. This study aims to evaluate the prevalence of vitamin D deficiency and the proportion of symptomatic patients among individuals undergoing routine checkups.

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Methods

This was a retrospective observational study conducted over a period of six months from January 2025 to June 2025. The study population included all patients undergoing routine health check-ups in our Hospital. Verbal consent was obtained, and patients were informed that their responses would be used for research.

Patients aged 18 years and above who had their serum 25-hydroxyvitamin D levels measured were included in the study. Patients who were already on vitamin D supplementation, or those with chronic kidney disease, chronic liver disease, or malabsorption syndromes, were excluded.

Vitamin deficiency was defined as serum vitamin D level <20 ng/ml. Patients presenting with musculoskeletal complaints such as bone pain, muscle weakness, or fatigue were considered symptomatic. Musculoskeletal symptoms were assessed through telephonic clinical interviews and symptoms were recorded based on patient self-report.

Serum 25-hydroxyvitamin D levels were measured from venous blood samples using the VITROS 5600 Integrated System. All samples were analyzed in the same hospital laboratory following standardized internal quality control protocols. Data analysis was performed by calculating the prevalence of vitamin D deficiency as the proportion of deficient patients among the total study population. Similarly, the prevalence of symptomatic cases was calculated both in the total population and within the vitamin D deficient subgroup. As this was a retrospective prevalence study including all eligible patients over a fixed time period, no prior sample size calculation was performed. However, the final sample size was sufficient to estimate the prevalence of vitamin D deficiency with acceptable precision at the 95% confidence level.

Results

A total of 646 patients undergoing whole body checkups over the last 6 months were included in this study. The

cohort comprised 146 males (22.6%) and 500 females (77.4%), with ages ranging from 19 to 87 years.

Overall, 313 patients (48.5%) were found to have vitamin D levels below 20 ng/ml, indicating vitamin D deficiency. Vitamin D deficiency was present in 64 males (43.8%) and 243 females (48.6%). Although deficiency was more common among females, the difference between males and females was not statistically significant (Chi-square test, $p > 0.05$). Of these patients with vitamin D deficiency, 85 (27.2%) were symptomatic. Overall symptomatic vitamin D deficiency was observed in 13.2 % of the total patients. (Table 1)

Discussion

Vitamin D is essential for calcium homeostasis, bone health, and muscle function. The major source of vitamin D is exposure to natural sunlight.^{2,8,12-14} Very few foods naturally contain vitamin D. Thus, the major cause of vitamin deficiency is inadequate exposure to sunlight.⁷⁻⁹ This study demonstrates a prevalence of vitamin D deficiency among patients attending routine health checkups, consistent with global reports.^{1,6,15-18} Symptomatic patients (27.2% of the deficient group) predominantly presented with musculoskeletal complaints, which are well recognized early features of deficiency.^{1,19}

Deficiency can exist without obvious symptoms but still cause subclinical bone loss, muscle weakness, and increased fracture risk. Many individuals with deficiency present only when complications arise.¹ Long term vitamin D deficiency can cause decreased bone mineral density before symptom develops.^{20,21} In adults, since the epiphyseal plates are closed, and there is enough mineral in the skeleton to prevent skeletal deformities, osteomalacia often gets undetected. However, osteomalacia causes a decrease in bone mineral density and is associated with isolated or generalized aches and pains in the bones and muscles.^{22,23} Elderly people have increasing

Table 1: Prevalence of Vitamin D deficiency and associated symptoms among patients undergoing routine check-ups (n = 646)

Parameter	n / N	Prevalence (%)	95% CI
Overall Vitamin D deficiency (<20 ng/mL)	313 / 646	48.4	44.5 – 52.3
Vitamin D deficiency in males	64 / 146	43.8	35.8 – 52.1
Vitamin D deficiency in females	243 / 500	48.6	44.1 – 53.1
p-value (Male vs Female)	—	—	>0.05
Symptomatic among Vitamin D-deficient patients	85 / 313	27.2	22.6 – 32.5
Overall symptomatic Vitamin D deficiency (entire cohort)	85 / 646	13.2	10.8 – 16.0

sway and more frequent falls thereby increasing their risk of fracture.^{24,25} Muscle weakness is a prominent feature of severe vitamin D deficiency.^{26,27}

In this study, nearly half of the patients (48.5%) demonstrated vitamin D deficiency (levels <20 ng/ml). Among those with deficiency, approximately one-quarter (27.2%) exhibited clinical symptoms, underscoring the clinical significance of vitamin D insufficiency beyond biochemical findings.

The prevalence of vitamin D deficiency in our study is lower than that reported in a Nepalese tertiary care hospital-based study by Poudel et al., who observed a deficiency prevalence of 69.6%.²⁸ This difference may be due to variations in study population and setting, as their cohort predominantly included patients attending outpatient services for clinical complaints, whereas our study involved individuals undergoing routine whole-body health check-ups, likely representing a relatively healthier population. Despite this difference, both studies demonstrated a female predominance in vitamin D deficiency.

The prevalence of symptomatic vitamin D deficiency among all patients was 13.2%, highlighting that a substantial number of individuals with low vitamin D may remain asymptomatic. Notably, over 70% of deficient patients were asymptomatic, emphasizing the silent nature of deficiency. The high proportion of asymptomatic cases in this study raises an important question about screening and supplementation.

Guidelines recommend supplementation for deficient individuals to prevent long term complications, regardless of symptoms presence.^{1,6,29}

Our findings reinforce this recommendation, as untreated deficiency may remain clinically silent for years before manifesting as osteoporosis or fracture.

Limitations include its retrospective design and lack of detailed assessment of lifestyle factors such as dietary intake, physical activity, or sun exposure, which could influence vitamin D status. In addition, symptom severity was not quantified, and long-term outcomes following supplementation were not assessed.

Routine screening and appropriate supplementation should be considered to prevent long term complications. Further prospective studies are warranted to explore causative factors and optimize vitamin D supplementation protocol.

Conclusion

Vitamin D deficiency is prevalent among patients undergoing routine health evaluations, with a majority being asymptomatic, highlighting the importance of screening and preventive strategies.

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