



Prevalence of Vitamin D Deficiency in Patients with Inflammatory Bowel Disease

Aman Gupta, Vijant Chandail, Rangat Sharma

Abstract

Background: Vitamin D deficiency in inflammatory bowel disease (IBD) patients may have important clinical implications. Therefore, it is important to investigate the prevalence of vitamin D deficiency in patients with IBD to better understand its impact on disease management and outcomes. **Objectives:** To assess the prevalence of vitamin D deficiency in patients with IBD using a radioimmunoassay method. **Material & Methods:** This was a prospective, observational study conducted at the Department of Medicine, Government of Medical College Jammu, India for a year from 1 November 2021 to 31 October 2022. Adult patients from OPD and IPD with biopsy proven IBD were included. **Results:** A total of 40 patients were included in the study with mean age of 38.7 years. Majority of patients (70%) were male and 50% patients belonged to age group of 30-60 years. The mean vitamin D level was 25.6 ng/mL and 62.5% of patients observed with vitamin D deficiency. Both genders and age were affected, with a significant proportion of patients having abnormal vitamin D levels. The vitamin D level was found to be comparable between both genders ($P>0.05$) and age groups (0.229). **Conclusion:** The present study investigated the high prevalence of vitamin D deficiency among patients with IBD. Additionally, patients were supplemented with vitamin D and were followed for further monitoring and evaluation for their outcomes.

Key words

IBD, Vitamin D deficiency, Crohn's disease, Ulcerative colitis

Introduction

Inflammatory bowel disease (IBD), including conditions such as Crohn's disease and ulcerative colitis, is characterized by chronic inflammation of the gastrointestinal tract. IBD affects millions of individuals worldwide, with a rising incidence and prevalence in recent years. The pathogenesis of IBD is complex and involves a dysregulated immune response, genetic predisposition, and environmental factors.^[1]

Vitamin D, commonly known for its role in bone health, has now been discovered to play crucial role in maintaining the integrity of the gastrointestinal barrier, regulating the gut microbiota, and supporting the inflammatory immune response in the gastrointestinal system.^[2,3] Moreover, it plays a significant role in immune regulation and

maintaining intestinal homeostasis.^[4-6] Several studies have indicated a potential link between vitamin D deficiency and the development, severity, and progression of IBD.^[7-9] It has been observed that patients with IBD frequently have low levels of vitamin D.^[10-12] The underlying mechanisms for this association are not fully understood, but it is believed that vitamin D deficiency may contribute to dysregulated immune responses and impaired intestinal barrier function, which are key features of IBD.^[13]

Moreover, vitamin D deficiency in IBD patients may have important clinical implications. Vitamin D deficiency may also be linked to complications of IBD, such as osteoporosis and impaired bone health, which are

Department of Medicine, Govt. Medical College, Jammu, Jammu and Kashmir (J&K), India

Correspondence to: Dr. Aman Gupta, Lecturer, Department of Medicine, Govt. Medical College, Jammu (J&K), India

Manuscript Received: 05.06.2023; **Revision Accepted:** 12.08.2023;

Published Online First: 10 January, 2024.

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Cite this article as: Gupta A, Chandail V, Sharma R. Prevalence of vitamin D deficiency in patients with inflammatory bowel disease. JK Science 2024;26(1):31-4.



commonly observed in these patients.^[14] Therefore, it is important to investigate the prevalence of vitamin D deficiency in patients with IBD to better understand its impact on disease management and outcomes. This study aimed to assess the prevalence of vitamin D deficiency in patients with IBD using a radioimmunoassay method, providing valuable insights into the relationship between vitamin D status and IBD.

Material & Methods

This prospective, observational study was conducted at the Department of Medicine, Government of Medical College Jammu, India for one year between 1 November 2021 and 31 October 2022.

The study was approved by the institutional ethics committee and was performed in accordance with the Declaration of Helsinki and the International Conference on Harmonization guidelines. Written informed consent was obtained from all the participants prior to enrolment in this study.

Adult patients with biopsy-proven IBD (ulcerative colitis and Crohn's disease) presented at OPD and IPD were included in the study. Those patients who were diagnosed with serious life-threatening co-morbidities, malignancy, renal/hepatic failure, pregnant/breastfeeding women and patients with diagnosis of toxic megacolon and those presenting with acute severe colitis were excluded from the study. Also, those who already supplemented with vitamin D within past 6 months were excluded.

Vitamin D level analysis was done in patients who met the inclusion criteria along with detailed history, examination and all the routine blood investigations with vitals were collected.

Vitamin D 25(OH) analysis was done by Chemiluminescence Immunoassay (CLIA) method. Chemiluminescence immunoassay is based on the principle in which after applying Vitamin D to CLIA, a labelled antibody induces transformation of a substrate into a photon-emitting module. CLIA measures the amount of light emitted and correlates it to the amount of vitamin D. Vitamin D levels were measured using (ng/mL) units.

Statistical Analysis

The data was analysed using Statistical Package for The Social Sciences (SPSS) software, version 23.0. Descriptive statistics, including mean and standard deviation (SD) were used to summarize demographic characteristics of the patients, while frequency and percentages were used for categorical variables. The chi-square test was used to compare qualitative variables between groups. A $p < 0.05$ was considered statistically significant.

Results

A total of 40 patients were enrolled in the study, with mean age of 38.7 years. Out of them, 28 patients (70%) were male and 12 patients (30%) were female. Thirty-eight of the 40 participants were diagnosed with Crohn's disease and two with ulcerative colitis. The majority of patients (50%) belonged to the age group 30-60 years, followed by 37.5% belonged to the age group less than 30 years, and 12.5% being of age more than 60 years. The mean age of study population was 38.7 years. The mean vitamin D level in the study population was 25.6 ng/mL. Abnormal vitamin D levels, defined as less than 30 ng/mL, were recorded in 62.5% of the patients, while 37.5% of the patients had normal vitamin D levels, defined as greater than 30 ng/mL [Table 1].

When analysing the vitamin D levels across different age groups, it was found that 46.7% of patients in the age group of <30 years had abnormal vitamin D levels. In the age group 30-60 years, 75% of patients had abnormal vitamin D levels, while 25% had normal vitamin D levels. In the age group >60 years, 60% of patients had abnormal vitamin D levels, while 40% had normal vitamin D levels. However, no significant correlation was observed between age groups and vitamin D levels ($P = 0.229$).

The vitamin D level was found to be comparable between both genders. Among male patients, 60.7% had abnormal vitamin D levels, while among female patients, 66.7% had abnormal vitamin D levels. However, the difference in vitamin D levels between male and female patients was not statistically significant ($P > 0.05$) [Table 2].

The correlation coefficient between age and vitamin D levels was found to be 0.0786. This indicates a weak **Table 1: Baseline characteristics.**

Characteristics	Total (N=40)
Age (years), mean (SD)	38.7 (15.7)
Age group (years)	
<30	15 (37.5)
30-60	20 (50.0)
>60	5 (12.5)
Sex	
Male	28 (70.0)
Female	12 (30.0)
Vitamin D levels (ng/mL), mean (SD)	25.6 (10.2)
Vitamin D range	
Abnormal (<30 ng/mL)	25 (62.5)
Normal (>30 ng/mL)	15 (37.5)
Data shown as n (%), unless otherwise specified.	

Table 2: Age and gender wise distribution of vitamin D levels.

Parameters	Vitamin D level		P value
	Abnormal	Normal	
Age group			
<30 years	7 (46.7)	8 (53.3)	0.229
30-60 years	15 (75.0)	5 (25.0)	
>30 years	3 (60.0)	2 (40.0)	
Sex			
Male	17 (60.7)	11 (39.3)	>0.05
Female	8 (66.7)	4 (33.3)	
Data shown as n (%).			

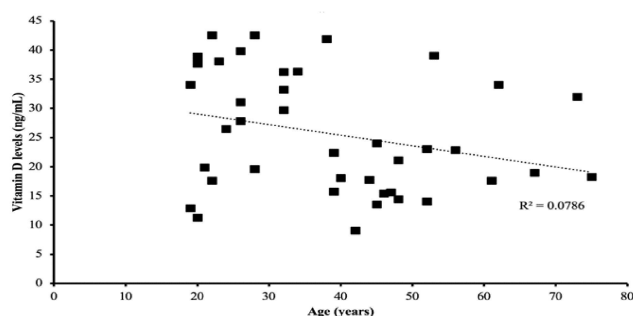


Figure 1: Correlation between age and vitamin D levels.

positive correlation between age and vitamin D levels in patients with IBD [Figure 1].

Discussion

Given the potential impact of vitamin D on the pathogenesis and clinical course of IBD, investigating its prevalence in this patient population is of great interest. Various studies have examined vitamin D status in IBD, but results have been conflicting, with reported prevalence rates ranging widely. These discrepancies may be attributed to differences in study design, patient characteristics, geographic location, and methods used to assess vitamin D levels.

Therefore, a comprehensive assessment of the prevalence of vitamin D deficiency in patients with IBD is warranted. This study aimed to address this gap in the literature by utilizing radioimmunoassay, a reliable and widely used method, to accurately measure vitamin D levels in a well-defined cohort of IBD patients. The findings provided valuable insights into the extent of vitamin D deficiency in this population and may have implications for optimizing disease management, including the potential for vitamin D supplementation as an adjunct therapy.

In the present study, overall 62.5% of patients observed

with vitamin D deficiency. These findings suggest that there is a high prevalence of vitamin D deficiency in patients with IBD. This is in line with several previous studies which have consistently reported a significant association between IBD and low vitamin D levels. A study conducted by Pallav K, *et al.* found that 61.6% of IBD patients had vitamin D deficiency.^[15] Similarly, another study by Rasouli E, *et al.* reported vitamin D deficiency in 64.7% of patients with IBD.^[16] Moreover, the findings of the large population-based multicentric study involving 1888 cases highlight significant differences in the prevalence of IBD and dairy food intolerance among different ethnic groups. Africans and Indians showed a higher prevalence of IBD, while Asians exhibited the highest incidence of dairy food intolerance. The study also identified a substantial number of individuals diagnosed with ulcerative colitis (571 cases) and Crohn's disease (189 participants) within the IBD patient population.^[17] These results underscore the importance of considering ethnic and regional variations when studying IBD and its associated factors.

In the present study, mean vitamin D levels in patient with IBD were 25.6 ng/mL at the time of diagnosis, and no significant difference was observed among the male and female gender. Moreover, both genders were affected, with a significant proportion of patients having abnormal vitamin D levels. This is in agreement with previous study where there was no significant gender difference in the vitamin D levels in patients with ulcerative colitis.^[18] This suggests that gender may not be a significant determinant of vitamin D status in patients with IBD. However, it is important to note that other factors, such as disease severity, medication use, or lifestyle factors, may have a more substantial impact on vitamin D levels in these patients. Unfortunately, studies specifically examining the influence of these factors on vitamin D status in IBD patients are limited. Emerging evidence indicates that vitamin D may play a role in the development of IBD; however, the precise mechanisms involved have not been fully understood yet. There is a significant association between vitamin D levels and disease activity in IBD,^[19,20] although its exact implications in treatment remain uncertain.

A number of studies have investigated the association between age and vitamin D deficiency in individuals with IBD. A study by Frigstad and co-workers evaluated vitamin D concentrations in 408 Norwegian patients with IBD and found no significant associations between age and vitamin D levels.^[7] Similarly, Han *et al.* reported similar findings in Korean patients, where univariate binary logistic regression analysis revealed that patients younger than



40 years were at risk for vitamin D deficiency. However, a multivariate logistic regression analysis conducted by the authors showed that only female sex and the presence of Crohn's disease were associated with vitamin D deficiency.^[21] According to Pallav et al., in a study involving American patients, African-American race and a body mass index greater than 30 were found to be associated with vitamin D deficiency in individuals with IBD. However, age was not identified as a significant factor in determining vitamin D deficiency in this study.^[15] Likewise, present study showed a weak positive correlation between age and vitamin D levels in patients with IBD. However, it is important to note that the correlation coefficient is relatively small, suggesting that age alone may not be a strong predictor of vitamin D levels in these patients.

Therefore, based on the available data, there is no strong evidence to suggest a significant correlation between age and vitamin D levels in patients with IBD. Further research with larger sample sizes may be needed to investigate the relationship between age and vitamin D levels more comprehensively in this patient population.

Conclusion

The present study revealed a high prevalence of vitamin D deficiency in patients with IBD. Improving vitamin D status through appropriate supplementation strategies is important for managing IBD and enhancing gastrointestinal barrier integrity, gut microbiota regulation, and the inflammatory immune response in the gut. Further research is needed to explore the optimal approaches for vitamin D supplementation in this patient population.

Financial Support and Sponsorship

Nil.

Conflicts of Interest

There are no conflicts of interest.

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