

Vitamin D level among Patients of Inflammatory Bowel diseases and its Correlation with Severity of Disease

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ABSTRACT

Background: Inflammatory bowel diseases (IBD) are the chronic, disabling illnesses causing inflammation and ulceration all over the gastro-intestinal tract. Vitamin D plays an important role in the regulation of inflammatory immune responses, the surveillance of the microbiota in the gut, and the protection of the stability of the gastrointestinal mucosa. **Objective:** To determine the vitamin D levels in patients with inflammatory bowel diseases and its correlation with the severity of the disease. **Study Design:** Cross-sectional study. **Settings:** Physiology department LUMHS/ Jamshoro with collaboration Surgery and Gastroenterology departments of LUMHS Jamshoro, Pakistan. **Duration:** November 2021–May 2022. **Methods:** Diagnosed cases of inflammatory bowel diseases (IBD), both Ulcerative colitis and Crohn's disease, meeting the criteria were included. A 5 mL blood sample was taken from each case to assess the vitamin D level. All the information was collected through the use of a study proforma, and the analysis was performed with the SPSS programmed 26.0. **Results:** A total of 60 patients with inflammatory bowel diseases were studied, their average age was 35.66 ± 4.55 years. Out of study participates, the males were 60.0% and females were 40.0%. 43.3% of the cases had mild disease, 43.3% had moderate disease, and 13.4% had severe disease. Most of the cases 73.3% had moderate deficiency, 13.3% of study participants had mild deficiency, and 13.3% of cases had severe deficiency. Vitamin D deficiency was found to be statistically significant according to gender ($p = 0.059$), and there was a statistically significant association between vitamin D deficiency and disease severity ($p = 0.002$). **Conclusion:** The deficiency of vitamin D was observed to be highly prevalent among patients with inflammatory bowel diseases.

Keywords: Vitamin D, Deficiency, IBD.

INTRODUCTION

Inflammatory bowel disease, is distinguished by persistent inflammation of the gastrointestinal tract, which can appear in the numerous clinical manifestations. There is a larger frequency of ileocolonic Crohn's disease across the Asian countries, compared to the situation in western nations; furthermore, males aged 20 and 39 years old also seem to be more affected by Crohn's disease in Asian nations than in western countries. Numerous underdeveloped African, Asian, and Latin American nations lack national registries,

which means that much less is known about the prevalence and incidence of IBD in those nations. Both environmental and genetical factors play a role in its pathogenicity, combined with an impact on the host-microbe interactions.¹

The immune reaction against the gut tissue plays a pivotal role. Previous studies have pointed the IBD is common in northern countries of Globe at high altitudes and commonly diagnosed in the winter seasons.^{1,2} Recently, cumulative scientific studies have proven the deficiency of vitamin D in the IBD patients compared to

the general population, and has got consideration of the environment as a potential component in its pathophysiology.^{3,4} Vitamin D is one of the fat-soluble vitamins that is either consumed through diet or produced in the skin upon exposure to sunlight (UVB). Vitamin D deficiency plays a role in abnormal immune reactions in the gut, resulting in intestinal auto-inflammation.^{1,5}

Extrasosseous functions of vitamin D are myriad, aside from its role in calcium homeostasis and bone mineralization. Illnesses related to the immune system have been shown to be associated with lower concentrations of vitamin D, indicating its immunoregulatory and immunomodulatory functions. High expression of vitamin D receptors is noted in the intestine, particularly the large colon. Vitamin D works with several immune system components to maintain the integrity of the gastrointestinal system, in addition to immune defence responses and adaptable T-cell activities.^{1,6,7}

Previous studies have confirmed a correlation of the vitamin D concentration with the markers of IBD disease inflammation and activity.^{8,9} Low serum vitamin D levels are noted in IBD patients taking steroids, who particular having a higher risk of relapse and hospital admissions. Vitamin D replacement in IBD has been linked to a lower risk of developing Crohn's disease-related surgeries compared to individuals with lower serum vitamin D concentrations,^{10,11} while other studies¹² have reported controversial results that require further investigation. The above literature review reveals that low vitamin D intake has a significant negative impact on processes of inflammation in the gut and could be a risky environmental element for the development of the disease in the IBD patients. Vitamin D deficiency in IBD,^{1,3} is often associated with exaggerated disease activity with frequent relapses demanding emergency support and hospitalization,^{13,14} and increasing the financial burden. Correction of vitamin D deficiency decreased the IBD disease activity, and surgical intervention.¹⁵

The aim of the present prospective study was to evaluate the vitamin D levels in IBD patients and its correlation with inflammatory markers. This study explores the recent information regarding vitamin D deficiency in patients with inflammatory bowel diseases. By giving patients vitamin D supplements and examining basic inflammatory biomarkers, the current research may help the treating doctors and surgeons reduce inflammatory bowel diseases activity, relapses, surgery, complications, and the financial load.

METHODS

This cross-sectional study was done at the outpatient department of Surgery and Gastroenterology at Liaquat University of Medical and Health Sciences, Jamshoro/Hyderabad. The study was done over a period of six months, from November 2021 to May 2022. Before the start of the study, ethical approval was taken from the ethical committee, Liaquat University.

Study sample size calculation was done by Rao-soft sampling calculator the sample size is n=60. The margin of error is 5%, with a confidence level of 95%.

All the diagnosed cases of IBD, both UC and CD, in patients aged 20–40 years and both genders were included. Diagnosed were confirmed and re-confirmed by consultant physician and surgeon having minimum experience of 5 years.

Patients were counselled to explain the purpose of the study. Patients with intestinal tuberculosis, irritable bowel syndrome (IBS), gut neoplasms, and those who were not willing to participate in the study were excluded.

The Harvey Bradshaw Index (HBI) was employed for the evaluation of Crohn's disease and its severity, whereas the (MTWSI) was used for the evaluation of Ulcerative Colitis and its severity.^{17,18} Written informed consent was obtained before the beginning of the study, both the scope of the study as well as the processes that will be carried out were discussed. A 5 mL blood sample was taken from each case to assess the vitamin D level. Vitamin D deficiency was categorized as; Severe deficiency <10ng/dl, Deficiency 10-19.9 ng/dl, insufficiency 20 – 29.9 ng/dl, and sufficiency ≥ 30 ng/dl.

All the information was collected via a study proforma, and the statistical analysis was done using SPSS version 26.0. Continuous variables like (age, vitamin D levels) presented in form of mean and standard deviation. Categorical variables were analyzed in terms of frequency and percentage. A Chi-square test and Pearson correlation were applied, and a p-value ≤0.05 was considered significant.

RESULTS

A total of 60 patients with inflammatory bowel diseases were studied; their average age was 35.66 ± 10.55 years, with an age range of minimum 20 years and maximum 40 years. Males were 60.0% and females were 40.0%. As per the severity of the disease, 43.3% of the cases had mild disease, 43.3% had moderate disease, and 13.4% had severe disease. Table 1

Table 1: Descriptive statistics of demographic characteristics (n=60)

Variables		Statistics	
Mean age		35.66 ± 4.55 years	
Hemoglobin level		10.63 ± 2.60 g/dl	
Gender	Males	36	60.0%
	Females	24	40.0%
	Total	60	100.0%
Grades of disease	Remission	--	--
	Mild	26	43.3
	Moderate	26	43.3
	Severe	08	13.4
	Total	60	100.0

All of the study participants had low vitamin D levels, with the majority of cases (73.3%) having moderate deficiency, 13.3% having mild deficiency, and 13.3% having severe deficiency. Table.2

Table 2: Patients distribution according to severity of vitamin D deficiency (n=60)

Vitamin D deficiency	Frequency	Percent
Insufficiency 20 -29.9 ng/dl	8	13.3%
Deficiency 10-19.9 ng/dl	44	73.4%
Severe deficiency <10ng/dl	8	13.3%
Total	60	100.0%

Vitamin D deficiency was found statistically significant according to gender, as males had a higher deficiency value and females had a more severe deficiency (p = 0.059). Furthermore, there was a statistically significant link between vitamin D deficiency and disease severity (p = 0.002). Table.3

Table 3: Vitamin D deficiency according to gender and severity of disease (n=60)

Variable		Vitamin D deficiency			p-value
		Severe Deficiency	Deficiency	Insufficiency	
Gender	Males	2	30	4	0.059
		3.3%	50.0%	6.7%	
Females	Females	6	14	4	
		10.0%	23.3%	6.7%	
Severity of disease	Mild	7	17	2	0.002
		11.7%	28.3%	3.3%	
	Moderate	1	23	2	
		1.7%	38.3%	3.3%	
	Severe	0	4	4	
		0.0%	6.7%	6.7%	
Total	Total	8	44	8	
		13.3%	73.3%	13.3%	

DISCUSSION

This study has been done to evaluate the vitamin D levels in patients with inflammatory bowel diseases, and a total of 60 patients were studied, their average age was 35.66 ± 4.55 years, and the males were in the majority 60.0%. Similarly, Torella MC *et al*¹⁵ reported that the median age was 41 years and males were 56%. On the other hand Qureshi M *et al*¹⁶ reported that the research comprised 54 UC patients in total, with a male to female ratio of 1:1 and a total of 27 male and 27 female patients. At the time of data analysis, the mean age of patients was 43.8 12.8 years (median 42, range 18-75), up from 38.7 11.8 years (median 36.5, range 18-64) at the time of UC diagnosis. The greatest age of onset was the fourth decade. ¹⁶ The treatment of IBD, which includes Crohn's disease and ulcerative colitis, is typically difficult for individuals and represents a significant financial and logistical burden on the healthcare system.¹⁷ In past few years, there has been a great deal of interest in the immunomodulating impacts of the vitamin D due to its possible harmful influence on the pathogenesis of IBD. Individuals diagnosed with IBD often have insufficient levels of vitamin D. Vitamin D may play a significant role in reducing the severity of disease, according to the findings of several clinical trials.¹⁷

In this study, as per severity of disease, 43.3% of the cases had mild disease, 43.3% had moderate disease, and 13.4% had severe disease. Comparatively, the study by Sood A *et al*¹⁸ reported that the majority of the patients (70%) had severe to moderate illness, which was followed by mild to moderate illness (23.6%) and severe disease observed in 6.4% of the cases.

In this study, all of the study subjects had lower vitamin D levels, particularly as most of the cases 73.3% had moderate deficiency, 13.3% of study subjects had mild deficiency, and 13.3% had severe deficiency, and vitamin D deficiency was found to be statistically significant according to gender as; males had higher deficiency and females had higher severe deficiency (p=0.059). According to a few studies, the patients of IBD possess a greater prevalence of vitamin D insufficiency, however, it hasn't been conclusively proven that this rate is higher than that of other chronic illnesses, inflammatory disorders, or even healthy people in that area.¹⁴ Levin *et al.* reported that among children having IBD in a sample predominately made up of individuals with Crohn's disease, 19% of cases had a deficiency of vitamin D and insufficiency was in 38% of cases.¹⁹ Inconsistently, according to Alkhouri *et al.*, observed that the children having IBD were less likely to have vitamin D deficiency (62%) compared the control group (75%).¹⁰ A significant retrospective research of individual having IBD from Wisconsin found that 11% of participants had significant vitamin D insufficiency and that approximately 50% of

participants had UC or Crohn's disease,^{14,20} an recurrence estimates that is in line with other IBD cohorts that have been published.²¹ Although the majority of studies have focused on the frequency of IBD cases with advanced disease, vitamin D insufficiency does not seem to be only related to advanced disease.¹⁴ Approximately 22% of Canadian patients with newly diagnosed IBD were observed to have adequate amounts of vitamin D.²² An analysis of two recent orthopaedic surgery articles revealed an initial decline in 25(OH)D3 concentrations following a systemic response to inflammation caused by surgery and treated serum 25(OH)D3 as a negative acute phase responder.^{23,24}

CONCLUSION

Among patients with IBD, vitamin D insufficiency was observed to be extremely prevalent. Such initiatives might enhance the probability of getting IBD towards clinical remission with traditional therapy approaches, which would improve patient outcomes and lower healthcare costs.

LIMITATIONS

Limited sample sized study and conducted at single health facility.

SUGGESTIONS / RECOMMENDATIONS

Monitoring vitamin D levels for disease activity and IBD relapse may offer a novel approach to treating IBD, assisting in determining the best course of action for IBD patients and lowering medical expenses.

CONFLICT OF INTEREST / DISCLOSURE

None.

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