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Ethar Ibrahim Jasim Almahdi
AL-Najaf Health Directorate, Al-Najaf, Iraq

Jawad K Al-Diwan
Community Medicine, College of Medicine, Baghdad University, Iraq

Muslim Abdul Kareem Enaya
AL-Najaf Health Directorate, Al-Najaf, Iraq

Corresponding Author:
Ethar Ibrahim Jasim Almahdi
AL-Najaf Health Directorate, Al-Najaf, Iraq

The Effect of Vitamin D administration on the clinical manifestation of inflammatory bowel disease

Ethar Ibrahim Jasim Almahdi, Jawad K Al-Diwan and Muslim Abdul Kareem Enaya

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Abstract
Background: Inflammatory Bowel Disease (IBD), encompassing Crohn's disease (CD) and Ulcerative Colitis (UC), is a group of chronic inflammatory conditions of the gastrointestinal tract with increasing prevalence worldwide. The aim of the study is to evaluate the effect of Vitamin D on the clinical symptoms and signs of inflammatory bowel disease (IBD), specifically focusing on Crohn's Disease and Ulcerative Colitis.
Methods: This prospective cohort study at Najaf GIT Hospital will enroll 50 IBD patients (25 with Crohn's Disease and 25 with Ulcerative Colitis) to assess the effects of 800 IU/day Vitamin D administration. Clinical manifestations will be evaluated using the Harvey-Bradshaw Index for CD and the myo-score/disease activity index for UC, both before and four weeks after treatment.
Results: UC is more prevalent among younger patients and females, while CD is more common in older age groups and males. Employment status shows UC is more common among employed patients, and CD is slightly more prevalent among unemployed individuals. Vitamin D administration significantly increased the Grow Wellbeing score and decreased scores for Abdominal Pain, Abdominal Mass, Arthralgia, and Aphthous ulcers in CD patients, as well as reduced Stool Frequency, Rectal Bleeding, Mucosal Appearance, and Physician Rating of disease in UC patients. No significant differences were observed for other symptoms.
Conclusion: Vitamin D administration appears to have selective beneficial effects on certain clinical symptoms in patients with Crohn's Disease and Ulcerative Colitis. It significantly improves wellbeing and reduces specific symptoms such as Abdominal Pain and Rectal Bleeding. However, its impact on other symptoms remains inconclusive, indicating the need for further research to fully understand its therapeutic potential in IBD management.

Keywords: The Effect, Vitamin D, clinical manifestation, inflammatory bowel disease

Introduction
Inflammatory Bowel Disease (IBD), encompassing Crohn's disease (CD) and Ulcerative Colitis (UC), is a group of chronic inflammatory conditions of the gastrointestinal tract with increasing prevalence worldwide. These conditions are characterized by periods of remission and flare-ups, significantly impacting the quality of life of affected individuals. The etiology of IBD is multifactorial, involving genetic predisposition, environmental factors, immune dysregulation, and alterations in the gut microbiota [1]. Despite advances in understanding the pathophysiology of IBD, the quest for effective treatment strategies remains ongoing, with Vitamin D emerging as a potential therapeutic agent. Vitamin D, a fat-soluble vitamin primarily obtained through sunlight exposure and to a lesser extent from dietary sources, plays a crucial role in bone metabolism and calcium homeostasis [2]. Beyond its classical functions, Vitamin D has been recognized for its Immunomodulatory effects, which are mediated through the Vitamin D receptor (VDR) present on various immune cells, including T and B lymphocytes, macrophages, and dendritic cells [3]. These effects suggest that Vitamin D may influence the immune response in IBD, potentially altering disease activity and progression. Numerous studies have documented the high prevalence of Vitamin D deficiency among IBD patients, which has been associated with increased disease activity and severity [4]. The anti-inflammatory properties of Vitamin D are believed to modulate the immune system by inhibiting the production of pro-inflammatory cytokines such as TNF-α, IL-1, and IL-6, while promoting the expression of anti-inflammatory cytokines like IL-10 [5]. Additionally, Vitamin D enhances the integrity of the epithelial barrier and influences the gut microbiota composition, further contributing to its potential therapeutic benefits in IBD [6].

The role of Vitamin D supplementation in managing IBD has been explored in several clinical trials and observational studies. A systematic review by Narula *et al*. (2017) reported that Vitamin D supplementation in IBD patients was associated with improved clinical outcomes, including reduced disease activity and lower relapse rates [7]. Furthermore, Vitamin D has been shown to decrease markers of inflammation and enhance mucosal healing in IBD patients [8]. However, the optimal dosage, duration of supplementation, and its long-term effects on disease progression remain areas of active research. Despite the promising findings, the clinical application of Vitamin D in IBD management is not yet well-established, with some studies yielding inconclusive results. For instance, a randomized controlled trial found no significant difference in relapse rates between IBD patients receiving high-dose Vitamin D supplementation and those receiving a placebo [9]. The aim of the study is to evaluate the effect of Vitamin D on the clinical symptoms and signs of inflammatory bowel disease (IBD).

Methods

This study was a prospective cohort study involving the enrollment of 50 patients with active (IBD). The study was conducted at Najaf GIT Hospital in Najaf City. All procedures was carried out in accordance with ethical standards and approved by relevant medical and ethical committees. A total of 25 patients was included with the study with Crohn's Disease (CD) and 25 patients included with Ulcerative Colitis (UC). Participants will be administered Vitamin D at a dosage of 800 IU per day. The clinical manifestations of IBD will be evaluated both before the initiation of Vitamin D administration and four weeks after the commencement of the treatment. For patients with Crohn's Disease, the Harvey-Bradshaw Index (HBI) will be employed to assess disease activity it was used to monitor the patients with Ulcerative Colitis [10], the myo-score/disease activity index will be utilized. These indices will provide quantitative measures of disease activity and symptom severity [11]. The study will conduct appropriate statistical analyses to determine the significance of changes in clinical symptoms and signs. P-values will be calculated to find the correlation between Vitamin D administration and the measured variants, thereby assessing the efficacy of Vitamin D in modulating disease activity in patients with IBD. Categorical data were summarized using frequency and percentage, while continuous data were described using mean, median, and standard deviation (SD). The Chi-square test was utilized to assess associations between categorical variables. Pearson correlation was employed to determine the relationships between continuous variables. Differences between means and medians of continuous variables were evaluated using the T-test. Additionally, the ROC curve was used to identify the most specific and sensitive cutoff points. A P-value of 0.05 or less was considered statistically significant.

Results

As shown in table 1, UC is more prevalent among younger patients, especially in the 11-20 years' age group (85.7% UC vs. 14.3% CD). In the 21-30 years' age group, the distribution is nearly equal (52.6% UC vs. 47.4% CD). CD is more common in the 31-40 and 41-50 years' age groups (56.3% and 75.0% respectively). Gender-wise, UC is more common in females (60.9% UC vs. 39.1% CD), while CD is more common in males (59.3% CD vs. 40.7% UC). UC is more prevalent among employed patients (66.7% UC), whereas CD is slightly more common among unemployed patients (53.7% CD). UC is more common among unmarried patients (61.1% UC), while CD is more common among married patients (56.3% CD). Education-wise, CD is more common among illiterate patients (62.5% CD), and UC is more common among those with primary education (66.7% UC). The P-values indicate no significant differences across these categories.

Table 1: Association between IBD and study variables

Variables		Groups		
		UC	CD	P-value
	11-20	6	1	
		85.7%	14.3%	
Age groups	21-30	10	9	0.12
		52.6%	47.4%	
	31-40	7	9	
		43.8%	56.3%	
	41-50	2	6	
		25.0%	75.0%	
	Females	14	9	
Gender		60.9%	39.1%	0.2
	Males	11	16	
		40.7%	59.3%	
	Employee	6	3	
Work		66.7%	33.3%	0.4
	Unemployed	19	22	
		46.3%	53.7%	
	Unmarried	11	7	
Marital		61.1%	38.9%	0.4
State	Married	14	18	
		43.8%	56.3%	
	Illiterate	3	5	
		37.5%	62.5%	
Education	Primary	8	4	0.5
		66.7%	33.3%	
	Secondary	4	4	
		50.0%	50.0%	
	High	10	12	
		45.5%	54.5%	

Table 2, the administration of Vitamin D to patients with Crohn's disease resulted in a significant increase in the Grow Wellbeing score compared to before the treatment. Additionally, there was a significant decrease in the scores for Abdominal Pain, Abdominal Mass, Arthralgia, and Aphthous ulcers post-Vitamin D administration. However, no significant differences were observed in the scores for Uveitis, Erythema Nodosum, New Fistula, Pyoderma Gangrenosum, Anal Fissures, and Abscesses following Vitamin D treatment. These findings highlight the selective impact of Vitamin D on specific symptoms of Crohn's disease.

Table 3, there is significant decrease in score of (Stool Frequency, Rectal Bleeding, Mucosal Appearance, Physician Rating of disease) after take Vitamin D than before take vitamin D in patients with ulcerative colitis.

Table 2: Difference mean of symptoms scores before take Vitamin D and after take vitamin D in patients with Crohn's disease

Variables	N	Mean	Std. Deviation	P-Value
Grow Wellbeing	Before	0.44	0.116	0.0001
	After	1.24	0.210	
Abdominal Pain	Before	1.48	0.22	0.0001
	After	0.32	0.09	
Abdominal Mass	Before	0.64	0.16	0.003
	After	0.12	0.06	
Arthralgia	Before	0.48	0.10	0.0001
	After	0.042	0.04	
Uveitis	Before	0.12	0.06	0.3
after	After	0.08	0.05	
Erythema Nodosum	Before	0.08	0.05	0.16
	After	0.00001	0.000001	
Aphthous ulcers	Before	0.36	0.09	0.001
	After	0.00001	0.000001	
Pyoderma gangrenous	Before	0.00001	0.000001	-
	After	0.00001	0.000001	
Anal Fissures	Before	0.08	0.05	-
	After	0.08	0.05	
New fistula	Before	0.08	0.05	0.3
	After	0.04	0.040	
Abscess	Before	0.00001	0.000001	-
	After	0.00001	0.000001	

Table 3: Difference mean of symptoms scores before take Vitamin D and after take vitamin D in patients with ulcerative colitis

Variables	*N*	Mean	Std. error	P-Value
Stool Frequency	Before	1.72	0.178	0.0001
	After	0.56	0.142	
Rectal Bleeding	Before	1.00	0.200	0.016
	After	0.44	0.130	
Mucosal Appearance	Before	2.44	0.117	0.0001
	After	1.40	0.129	
Physician Rating of disease	Before	2.12	0.133	0.0001
	After	1.16	0.138	

Discussion

The current study examined the effect of Vitamin D administration on the clinical manifestations of Inflammatory Bowel Disease (IBD), specifically focusing on Crohn's Disease (CD) and Ulcerative Colitis (UC). Our findings indicate that Vitamin D supplementation had differential impacts on the symptoms of CD and UC, offering insights into its potential therapeutic role in managing these conditions. In our study, UC was found to be more prevalent among younger patients, particularly in the 11-20 years' age group (85.7% UC vs. 14.3% CD). This trend shifted in older age groups, with CD becoming more common in patients aged 31-40 and 41-50 years (56.3% and 75.0% respectively). These results align with epidemiological data indicating that CD often has a bimodal age distribution, with peaks in early adulthood and middle age [12]. The gender distribution revealed that UC was more common in females (60.9% UC vs. 39.1% CD), while CD was more prevalent in males (59.3% CD vs. 40.7% UC). This gender disparity is consistent with previous studies suggesting a higher incidence of UC in females and CD in males [13]. Employment status showed that UC was more prevalent among employed patients (66.7% UC), whereas CD was slightly more common among unemployed individuals (53.7% CD). Marital status also played a role, with UC being more common among unmarried patients (61.1% UC) and CD among married patients (56.3% CD). These social determinants of health may reflect lifestyle factors and stress levels that influence disease manifestation and management [14]. Education level showed that CD was more common among illiterate patients (62.5% CD), while UC was more common among those with primary education (66.7% UC). This highlights the potential influence of health literacy on disease management and outcomes [15]. However, the P-values across these categories indicated no significant differences, suggesting that these demographic factors may not independently predict the type of IBD in our sample. The administration of Vitamin D to patients with CD resulted in significant improvements in certain clinical outcomes. Notably, there was a significant increase in the Grow Wellbeing score post-treatment, indicating an overall improvement in patient-reported wellbeing. Additionally, there was a marked decrease in the scores for Abdominal Pain, Abdominal Mass, Arthralgia, and Aphthous ulcers following Vitamin D supplementation. These findings are supported by existing literature that highlights the anti-inflammatory and immunomodulatory effects of Vitamin D in reducing gastrointestinal symptoms and improving overall health in CD patients [16, 17]. However, no significant differences were observed in the scores for Uveitis, Erythema Nodosum,

Conclusion

Vitamin D administration appears to have selective beneficial effects on certain clinical symptoms in patients with Crohn's Disease and Ulcerative Colitis. It significantly improves wellbeing and reduces specific symptoms such as Abdominal Pain and Rectal Bleeding. However, its impact on other symptoms remains inconclusive, indicating the need for further research to fully understand its therapeutic potential in IBD management.

Conflict of Interest

Not available

Financial Support

Not available

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