MJMR, Vol. 33, No. 2, 2022, pages (228-232).

Open Access
ISSN:2682-4558

*Research Article*

# Clinical correlation between serum vitamin D level and Irritable Bowel Syndrome

**Sara Kh. Ali[1], Inas M. Kamal Mohamed[1], Zaki M. Zaki[2] and Amr M. Elsayed[1]**

[1] Department of Hepatology, Gastroenterology and Endemic, faculty of Medicine, Minia university, Minia. Egypt

[2] Department of Clinical pathology, faculty of medicine, Minia university, Minia, Egypt

## Abstract

**Background:** Irritable bowel syndrome (IBS) is a common functional bowel disorder characterized by recurrent abdominal pain or discomfort associated with altered bowel habit. Recent studies have shown that vitamin D can influence numerous pathways involved in the development of IBS. The actual pathophysiologic processes involving IBS patients are still unknown. The aim of this study is to assess vitamin D level in patients with irritable bowel syndrome and estimate whether there is correlation between serum level of vitamin D and IBS. **Methods:** total of 113 people was studied, 45 subjects who diagnosed as irritable bowel syndrome according to ROME IV criteria, 23 met the exclusion criteria and 45 healthy subjects as a control group. Blood sample was taken to measure vitamin D in serum (25-hydroxyvitamin D) **Results**: vitamin D deficiency was found to be higher in the IBS group (76.6%) compared to control group (46.7%). When different subtypes were analyzed IBS-C subtype (62.2%) was more common than IBS-D subtype (20%) and IBS-M subtype (17.8%). **Conclusion:** Vitamin D, which plays a role in inflammatory processes, may also be of relevance in the pathophysiology of IBS. Vitamin D plays a crucial role in intestinal health by strengthening the mucosal barrier, regulating immune responses, and acting as an antimicrobial itself. In this study we found that vitamin D deficiency was found to be higher in the IBS group, so there is relation between vitamin d deficiency and irritable bowel syndrome.

**Keywords**: Irritable bowel syndrome, vitamin D deficiency, Rome IV.

## Introduction

Vitamin D is a hormone that has two key roles within the body: (i) to aid the absorption of calcium and phosphate and (ii) control the secretion of parathyroid hormone. The principal circulating form of vitamin D is 25-hydroxyvitamin D (25(OH)D; calcifediol), which is used clinically to determine vitamin D status. [(1)] There has been an augmented interest within the medical community in vitamin D, especially its deficiency, in various systemic disorders. The association of vitamin D in skeletal and extra-skeletal health is an established medical fact. [(2)] Vitamin D can be derived from the diet, such as with a diet high in oily fish and dairy products, or it can be produced in the body from sun exposure, Vitamin d deficiency can occur due to malabsorption of vitamin D and reduction of skin synthesis. Evidence suggests a critical role of vitamin D in controlling more than 200 genes that are involved in the regulation of the cell cycle, including proliferation, differentiation, and apoptosis. [(3)] It has been well documented that the receptor of vitamin D is expressed in most of the tissues such as the gut, nervous system, and immune cells. [(3)]

Roughly, 5% to 12% of the US populations have symptoms consistent with IBS, making it one of the most common conditions seen in primary care and gastroenterology. [(4)] The pathogenesis of irritable bowel syndrome (IBS) is complex, and, although it has evolved over the years, it is still not well-understood. A unifying theme is that the symptoms of IBS result from bidirectional dysregulation of brain–gut interactions, which manifests as enhanced visceral perception and altered bowel habits [(5)]
There are factors that increase the risk of developing IBS that include genetic predis-position, environmental factors (eg, early

adverse life events), and infectious gastroenteritis.[5] Currently the Rome IV Diagnostic Criteria for FBDs is currently the "Gold Standard" for the diagnosis of IBS.[6] Diagnostic criteria according to Rome iv criteria are Recurrent abdominal pain on average at least 1 day/week in the last 3 months, associated with two or more of the following criteria: 1. Related to defecation 2. Associated with a change in frequency of stool 3. Associated with a change in form (appearance) of stool. [6] Specific subtypes of IBS often drive treatment and care should be taken to classify patient symptoms into constipation predominant (IBS-C), diarrhea predominant (IBS-D), mixed (IBS-M), or unclassified (IBS-U). [7] this study is to assess vitamin D level in patients with irritable bowel syndrome and to detect there is correlation between serum vitamin d and IBS.

## Patient and Methods

68 subjects who attended GIT clinic seeking medical advice for abdominal pain Only 45 patients who met criteria of IBS based on Rome IV Criteria as cases group, any age from 18-50 years old, other 45 healthy individuals as (control group). Exclusion criteria: age< 18 and> 50 years old, Patients with chronic diseases, Pregnant or lactating females, Post-menopausal females, known organic gastrointestinal disorders or any treatment with steroids, vitamin D or calcium. Patients had full clinical assessment; History taking including ROME IV criteria for IBS, meticulous examination and Routine investigation; CBC, prothrombin time and concentration, ALT, AST, serum creatinine, calcium (ionized), Random blood glucose , Abdominal ultrasound and Blood sample was taken to measure vitamin D in serum (25-hydroxyvitamin D)

## Results

In this study, total of 90 individuals were studied, 45 cases who diagnosed as irritable bowel syndrome according to ROME IV criteria and 45 healthy ones as a control group .There are 34 (75.6%) females ,and 11(24.4%) males in IBS group while in control group 30 (66.7%) are females . Gender had no significant effect on vitamin D levels p. value 0.43. Their mean ages were 36.62 ± 8.34 We found when studying the irritable bowel syndrome that IBS-C subtype was more common than IBS-D subtype (62.2% VS 20%) and IBS-M was 17.8% We studied the correlation between vitamin D deficiency and irritable bowel syndrome, we measure serum vitamin d in patient with irritable bowel syndrome and other control group. vitamin D deficiency was found to be high in the IBS group (76.6%) compared to control group (46.7%). We found that the mean serum level of 25(OH) D in IBS patients was 22.29 ± 12.94 nmol/L compared to the control group 31.18 ± 14.76 nmol/L.

**Table (1): Demographic characteristics of the studied cases and control groups (N=90)**

| Characteristics | Cases group (N=45) | Control group (N= 45) | P value |
|---|---|---|---|
| **Age** | | | |
| **Mean ±SD** | 36.62 ± 8.34 | 36.09 ± 10.18 | 0.79 |
| **Sex** | | | |
| **Male** | 11 (24.4%) | 15 (33.3%) | 0.35 |
| **Female** | 34 (75.6%) | 30 (66.7%) | |
| **Marrital status** | | | |
| **Married** | 29 (64.4%) | 27 (60%) | 0.66 |
| **Single** | 16 (35.6%) | 18 (40%) | |
| **Occupation** | | | |
| **Housewife** | 19 (42.2%) | 16 (35.6%) | 0.32 |
| **Employee/Others** | 22 (48.9%) | 20 (44.4%) | |
| **student** | 4 (8.9%) | 9 (20%) | |
| **Smoking status** | | | |
| **Smoker** | 7 (15.6%) | 11 (24.4%) | 0.29 |
| **Non smoker** | 38 (84.4%) | 34 (75.6%) | |

P value was calculated by Independant Sample t-test for quantitative data and the Chi- square test for qualitative data; Significant level p value <0.05.

**Table (2): Distribution of different types for IBS among the studied cases(N=45)**

| IBS | Cases group (N=45) N (%) |
|---|---|
| IBS-C | 28 (62.2%) |
| IBS-D | 9 (20%) |
| IBS-M | 8 (17.8%) |

**Table (3): Serum vitamin D level among the studied groups (N=90)**

| | Cases group (N=45) | Control group (N= 45) | P value |
|---|---|---|---|
| **Mean ±SD** | 22.29 ± 12.94 | 31.18 ± 14.76 | 0.003* |
| **Range** | (6 – 60) | (13 – 60) | |
| **More than 30** | 11 (24.4%) | 24 (53.3%) | 0.005* |
| **Deficiency <30 nmol/L** | 34 (75.6%) | 21 (46.7%) | |

Table (3) show there were statistically difference between the mean serum level of vit d in the IBS group was (22.29±12.94) and the control group (31.18±14.76) (P. value 0.003). Also, there were statistically difference between the number and percentage of patients with vit d deficiency between the IBS group 34(75.6%) patients and the control group 21(46.7%) patients (P. value 0.005).

**Table (4): Multivariate regression analysis for factors predicting IBS**

| Independant factors | Adjusted OR (95% CI) | P value |
|---|---|---|
| **Age** | 1.03 (0.98 – 1.08) | 0.27 |
| **Sex** | | |
| Male | 1 (Ref.) | 0.43 |
| Female | 1.47 (0.56- 3.86) | |
| **Serum Vitamin D** | | |
| Normal | 1 (Ref.) | 0.004* |
| Deficiency | 4.01 (1.54- 10.44) | |

Regarding factors that predict IBS, deficiency of serum vit d show OR =4.01 (0.98-1.08) at 95% CI and this is significant predict factor for IBS while according to sex, female show OR =0.56-3.86 at 95% CI compared to male and this not significant.

## Discussion

Irritable bowel syndrome (IBS) is a functional gastrointestinal disorder which shows symptoms of recurrent abdominal pain coupled with changes in digestive behavior without organic abnormalities.[8] It is a chronic gastrointestinal (GI) tract disorder with a relapsing/remitting course that is possibly disabling.[9]

Abnormalities of the brain–gut axis function and immune system, visceral hypersensitivity, and disturbances of gastrointestinal (GI) motility have been associated with IBS.[10] VD is a fat-soluble steroid hormone mainly associated with the regulation of bone remodeling and control of absorption of calcium in the intestine. It may also interfere in a plethora of cellular mechanisms, and its deficiency is linked to many pathologies such as inflammatory bowel disorders.[11] prevalence of vitamin D insufficiency in IBS patients is possibly associated with a combination of factors such as low exposure to sunlight, and restricted intake of food with VD. Deficiency of VD is prevalent in individuals that present depression, anxiety, and fibromyalgia that are typically presented in IBS patients. [12]

Here In this study, there are 34(75.6%) from cases group are females, and 11(24.4%) are males while in control group 30(66.7%) are females.

This agreed with (Abbasnezhad, Amani et al., 2019) who reported (67.8%) most of the cases group are female, while (Jung et al., 2011) and (Jafri et al., 2005) found that the number of IBS cases was more in males than in females in their studies.

We found when studying the irritable bowel syndrome sub types that IBS- constipation (IBS-C) was more common than IBS- Diarrhea (IBS-D) subtype (62.2% VS 20%) and IBS-Mixed (IBS-M) was 17.8% . This agreed with (Elhosseiny et al., 2019)who examined subtypes of IBS and revealed that 26.6% were diarrhea predominant (IBS-D) while 73.4% were constipation predominant (IBS-C). On the contrary with (Dorn et al., 2009). The most frequent IBS subtype was IBS-D (46%), followed by IBS-C (32%) and IBS-M [(22).]

vitamin D deficiency was found to be high in the IBS group (76.6%) compared to control group (46.7%). We found that the mean serum level of 25(OH)D in IBS patients was 22.29 ± 12.94 nmol/L compared to the control group 31.18 ± 14.76 nmol/L. This was in agreement with, (Khayyat and Attar 2015) whose study revealed that vitamin D deficiency was found to be high in the IBS group (82%). the mean serum level of 25(OH)D in IBS patients was 21+12 nmol/L compared to the control group 31+16 nmol/L In a randomized control trial by (Amrousy et al., 2018), 112 individuals ages 14 to 18 from Tanta University Hospital that met the ROME III criteria for IBS with vitamin D levels of less than 20ng/ml were observed for 2 years. (Jalili et al., 2016 ) reported Blinded randomized clinical trial study with 100 IBS women their ages were 18-75 years who have vitamin d deficiency (21.23±8.45) .Moreover, (Cho et al., 2018)reported that in adolescents with IBS, the average vitamin D level was low (16.25 ± 6.58 ng/mL). (Khayyatzad eh et al., 2017) reported in Cross sectional study that Presence of IBS was associated with low levels of Vitamin D.

## Conclusion

vitamin D deficiency is predicting factor for irritable bowel syndrome So, there is positive correlation vitamin d deficiency and irritable bowel syndrome Vitamin d play an important role in pathogenesis of irritable bowel syndrome .so it is necessary to evaluate vitamin d level in IBS.

## Refrences


1. Holick MF, Holick MF. Vitamin D [electronic resource]physiology, molecular biology, and clinical applications. 2nd ed. Totowa, NJ: Humana; 2010.
2. Attar SM, Siddiqui AM. Vitamin D deficiency in patients with systemic lupus erythematosus. Oman Med J 2013 Jan; 28(1):42-47
3. Holick MF. Vitamin d deficiency. N Engl J Med. 2007;357(3): 266–281.
4. Palsson O.S., Whitehead W., Törnblom H., et. al.: Prevalence of Rome IV Functional Bowel Disorders Among Adults in the United States, Canada, and the United Kingdom. Gastroenterology 2020; 158: pp. 1262-1273
5. Drossman DA, Chang L, Chey WD, et al., Rome IV functional gastrointestinal disorders – disorders of gut-brain intera-ction. 4th edition. Raleigh, NC: Rome Foundation; 2016.
6. Marcin Włodarczyk, Aleksandra Sobolewska-Włodarczyk, 8 - Clinical diagnosis of irritable bowel syndrome, Editor(s): Jakub Fichna, A Comprehensive Overview of Irritable Bowel Syndrome, Academic Press,2020
7. Mead MN. Benefits of sunlight: a bright spot for human health. Environ Health Perspect 2008 Apr;116(4):A160-A167.
8. Lee, Y. J. and K. S. Park (2014). "Irritable bowel syndrome: emerging paradigm in pathophysiology." World journal of gastroenterology: WJG 20(10): 2456.
9. Lacy, B. E., et al., (2016). "Bowel disorders." Gastroenterology 150(6): 1393-1407. e1395.
10. Barbara, G., et al., (2011). "The immune system in irritable bowel syndrome." Journal of neurogastroenterology and motility 17(4): 349.

11. Cashman, K. D., et al., (2017). "Improved dietary guidelines for vitamin D: application of individual participant data (IPD)-level meta-regression analyses." Nutrients 9(5): 469.
12. Karaahmet, F., et al., (2013). "vitamin D supplementation and the irritable bowel syndrome." Alimentary pharmacology & therapeutics 37(4): 499-499.
13. ABBASNEZHAD, A., AMANI, R., HAJIANI, E., et al., 2016. Effect of vitamin D on gastrointestinal symptoms and health-related quality of life in irritable bowel syndrome patients: a randomized double-blind clinical trial. Neurogastroenterology & Motility, 28, 1533-1544
14. Jung, H. J., et al., (2011). "Are food constituents relevant to the irritable bowel syndrome in young adults? -a Rome III based prevalence study of the Korean medical students." Journal of Neurogastroenterology and Motility 17(3): 294.
15. Jafri, W., et al., (2005). "Frequency of irritable bowel syndrome in college students." Journal of Ayub Medical College Abbottabad 17(4): 9.
16. Elhosseiny, D., et al., (2019). "Factors associated with irritable bowel syndrome among medical students at Ain Shams University." Journal of the Egyptian Public Health Association 94(1): 1-9.
17. Dorn, S. D., et al., (2009). "Irritable bowel syndrome subtypes defined by Rome II and Rome III criteria are similar." Journal of clinical gastroenterology 43(3): 214-220
18. Jalili, Mahsa, Azita Hekmatdoost, et al., (2016) i. "Co-Administration of soy isoflavones and Vitamin D in management of irritable bowel disease." PloS one 11, no. 8 e0158545.
19. Cho, Y., et al., (2018). "Association of the vitamin D level and quality of school life in adolescents with irritable bowel syndrome." Journal of clinical medicine 7(12): 500.