

# Vitamin D in Ulcerative Colitis: A Cause or an Effect?

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## ABSTRACT

**Background and Aims:** Vitamin D deficiency is common among patients with inflammatory bowel disease, even when the disease is in remission. This study was designed to evaluate the serum levels of 25-hydroxy vitamin D [25(OH)-D3] in patients who suffered from ulcerative colitis and the control group in Golestan province in the northeast of Iran.

**Methods:** In this case-control study, 60 patients with a definite histopathological diagnosis of ulcerative colitis were included. The control group was selected from healthy blood donors. The serum levels of 25(OH)-D3 were measured by the ELISA method (ids-UK). Data were entered into the SPSS-16 software and were analyzed by t-test and Chi-square test.

**Results:** The mean serum level of vitamin D in the patients was significantly lower as compared to that in the control group (P-value <0.01). The differences in the levels of 25-OH-D3 were statistically significant between the two sexes, in both groups. A normal vitamin D level was seen in all cases with proctitis, in 20% of cases in the rectosigmoiditis group and in no cases in the pan-colitis group. The difference was statistically significant (p-value <0.01).

**Conclusions:** It can be concluded that the serum levels of vitamin D in the patients with ulcerative colitis are low and that inflammatory bowel disease can be a target for the specific vitamin D therapy.

**Key Words:** Vitamin D, Inflammatory bowel disease, Ulcerative colitis

## INTRODUCTION

Inflammatory Bowel Disease (IBD), which includes Crohn's Disease (CD) and Ulcerative Colitis (UC), is a chronic disease of unknown multi-factorial aetiologies. The course of the disease is unpredictable and the treatment must focus on the induction and maintenance of remission, on preventing complications and on improving and preserving the quality of life [1].

Vitamin deficiencies in general and the vitamin D deficiency in particular, have been reported in patients with inflammatory bowel disease, due to chronic diarrhoea, malabsorption of the nutrients, decreased outdoor activities, a short-term high-dose and a long-term low-dose of prednisone therapy; and it could be common even in the remission time of the disease [2-5].

Vitamin D is an important immune system regulator. As there are only few foods which contain enough vitamin D, they cannot be used as the only sources of this vitamin [6-8]. On the other hand, it has been shown that the active form of vitamin D (1, 25-dihydroxy vitamin D3) could inhibit the development of autoimmune diseases, including Inflammatory Bowel Disease (IBD) and increase bone mineralization when it is administered to experimental animals and human subjects [6,9]. So, it has not been clearly understood whether the vitamin D deficiency plays a role in causing the inflammation in the first place or whether it is the result of inflammatory bowel disease. This study was designed to evaluate the serum level of 25-hydroxy vitamin D in patients with ulcerative colitis and in a healthy control group in Golestan province, northeast of Iran.

## METHODS

In this case-control study, 60 patients with ulcerative colitis (N=60) and 60 control healthy persons were included. The exclusion criteria were as followings: a past history of anti-lipid medicines and a history of severe malabsorption diseases, renal disease, and current or past corticosteroid consumption. The cases were selected from IBD patients who were diagnosed not longer than 6 months prior to the study, which were not at the flare-up phase of the disease and they were classified as mild to moderate, to decrease the effect of the inflammation process on the vitamin level. The control group subjects were selected from those healthy blood donors who were referred to "Blood Transfusion Organization" in Gorgan city (N=60), which were age and sex matched. The individuals with gastrointestinal disorders were excluded from the control group. This project was approved by the local ethical committee board, and it was carried out with the adequate understanding and the informed consent of each subject. The serum levels of 25(OH)-D3 were measured by the ELISA method (ids-UK). Data were entered into the SPSS-16 software and analyzed by t-test and Chi-square test. All tests were free of charge for cases and controls and this was a voluntary decision.

## RESULTS

The mean serum level of 25(OH)-D3 in the patients (32.03±16.32 ng/dl) was significantly lower as compared to that in the control group (37.78±33.50 ng/dl) (p-value <0.01). The differences in the levels of 25(OH)-D3 were statistically significant between the two sexes in both groups, i.e. it was lower in women. [Table/Fig-1] It was reported that 68% of the men had normal serum levels of 25(OH)-D3, while only 14.3% of the women had normal serum

| Mean ± SD(ng/dl)  |                | Group  |
|-------------------|----------------|--------|
| Controls (N = 60) | Cases (N = 60) |        |
| 40.95± 35.99      | 41.89± 16.26   | Male   |
| 35.94± 32.32      | 24.98±12.36    | Female |

**[Table/Fig-1]:** Serum level of 25-hydroxy vitamin D3 in patients with ulcerative colitis and control group regards to the gender.

levels of 25(OH)-D3. The serum levels of 25(OH)-D3 in the patients with ulcerative colitis did not show a significant difference regards to the age groups, ethnicity and Body Mass Index (BMI).

All cases in the proctitis group had normal 25(OH)-D3 levels, while only 20% of the cases in the rectosigmoiditis group had normal levels of vitamin D and in the pan-colitis group, there was no case with normal levels of 25(OH)-D3. This difference was statistically significant (p-value <0.01). The serum levels of Vitamin D were found to be significantly decreased when the disease extended into the bowel [Table/Fig-2].

## DISCUSSION

In the present study, the ulcerative colitis patients had lower serum levels of 25(OH)-D3 than the subjects in the control group. In other studies, similar results were seen [3-5].

It should be noted that vitamin D is absorbed at the end of the ileum and that ulcerative colitis does not involve the small bowel frequently. By noting the role of vitamin D in the immune system [10] and with regards to the fact that the blood samples of the patients are taken during the very first months of the diagnosis and before the corticosteroids consumption, it could be said that the vitamin D deficiency may contribute to the pathogenesis of inflammatory bowel disease and that it increases the risk of ulcerative colitis. To achieve more accurate results, larger and more precise studies are necessary.

The mean levels of serum 25(OH)-D3 were 54.46 ng/dl, 26.51 ng/dl and 18.21 ng/dl in the proctitis, the recto-sigmoiditis and the pancolitis groups, respectively. Maybe the role of the lower levels of vitamin D in the adjustment of the immune system increases the intensity and spread of the bowel inflammation, as has been emphasized by other studies [9-10], and maybe vitamin D plays a role in the pathogenesis of this disease as has been hypothesized in the present paper.

We found that the serum levels of 25(OH)-D3 were higher in males than in females, both in the cases and in the control group. This may be explained on the basis of the special clothing of the women in our country (they wear dark and thick clothes due to their religious views) and their relative deprivation of the sun light.

Based on our results, no significant correlation was found between the serum levels of 25(OH)-D3 and the ethnicity or the Body Mass Index (BMI), which was similar to the findings of others.

## CONCLUSIONS

And finally, it can be concluded that the serum levels of vitamin D in the patients with ulcerative colitis is low and that this vitamin may play a role in the pathogenesis of this disease; on the other hand, inflammatory bowel disease can be a target for the specific vitamin D therapy.

| Mean ± SD (ng/dl) | Group            |
|-------------------|------------------|
| 54.46± 11.44      | Proctitis        |
| 26.51±7.79        | Rectosigmoiditis |
| 18.21±5.17        | Pancolitis       |

**[Table/Fig-2]:** Serum level of 25-hydroxy vitamin D3 in patients with ulcerative colitis regards to the location of involvement.

## AUTHORS' CONTRIBUTIONS

Taghi Amiriani, Hamidreza Joshaghani, Sima Sedighy and Hamide Akbari supervised the project scientifically, Gholamreza Roshandel analyzed the data, Fatemeh Nejadi Kelarijani and Somaye Barzanoni collected the data and Sima Besharat wrote the paper.

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