

Association between Vitamin D3 and inflammatory bowel diseases

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Abstract

Objective: To find out the association between vitamin D3 and inflammatory bowel disease

Study design: Randomized Controlled Trail

Place and duration: The study was conducted in King Salman Armed Forces Hospital, Tabuk, Kingdom of Saudi Arabia for the time period of 1 years (July 2015-July 2016).

Material & Methods: The study was a randomized controlled trail with 1:1 ratio of two groups. The sample size of 50 patients was achieved. The interventional group was provided with 300,000 IU intramuscular vitamin-D while the placebo group is given 1ml of saline and followed for 4 months. Both the groups were measured for PTH, ESR and serum level of 25 (OH)- vitamin D3 before and after intervention. Chi square test was performed to observe the association between vitamin D3 and inflammatory bowel disease (IBD).

Results: Total 50 patients were observed 25 in placebo group and 25 in intervention group. The study found out that serum hydroxyl vitamin D3 level in interventional group before and after was 32.3 ± 0.67 , 41.7 ± 6.2 while in placebo group it was 33.9 ± 8.9 and 34.8 ± 9.6 respectively 95% confidence interval.

Conclusion: Higher level of vitamin D3 is associated with prevention of inflammatory bowel diseases. Vitamin-D is playing a role of immune regulator in body and tends to improve bone and calcium homeostasis.

Keywords: vitamin D3 (Cholecalciferol), inflammatory bowel disease, homeostasis, Parathyroid hormone (PTH), Erythrocyte sedimentation rate (ESR)

Introduction:

Vitamin-D is a form of fat soluble vitamin. The active type of vitamin-D is calcitriol or 1,25 dihydroxyvitamin D3 that is required for bones calcium regulation and phosphorus metabolism in human body.¹ There are mainly two sources of vitamin-D in which one is diet and the other is ultraviolet rays (UV). The UV rays involve a synthesis in epidermis of skin in which photolytic cleavage of 7-dihydrocholesterol is converted into vitamin D3.² The recent studies considered vitamin-D as a hormone.³

In Inflammatory bowel disease (IBD) patients, the pathogenesis of vitamin-D hypovitaminosis is associated with various mechanisms that include reduction in sunlight exposure, lower

intake of oral vitamin-D, malabsorption of vitamin-D due to ileal resections and protein losing enteropathy leading to greater loss through gastrointestinal system.⁴ Vitamin-D has a supportive role in immune system specially prevention of inflammation. The role of vitamin-D is found to be very important in gastrointestinal inflammation and its deficiency leads to inflammatory bowel disease (IBD).⁵

Reduction in pro-inflammatory profile of IBD is determined by affect of cytokine induced apoptosis and disruption epithelial barrier function of cytokine. Epithelial apoptosis is considered as normal physiological event and its does not affect the mucosal barrier function mean while cytokine induced apoptosis is associated with dis-

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Table-1: Serum calcium level in placebo and interventional group

Serum calcium level	Interventional group (N=25)	Placebo group (N=25)	P value
Before	8.15±0.41	8.07±8.4	0.72
After	9.65±0.51	7.89±0.32	<0.00
P value	<0.000	0.25	

Table-2: Serum 25 Hydroxy vitamin D3 in interventional and placebo group

Serum Hydroxy vitamin D3	Interventional group (N=25)	Placebo group (N=25)	P value
Before	32.3±0.67	33.9±8.9	0.72
After	41.7±6.2	34.8±9.6	<0.000
P value	<0.001	0.12	

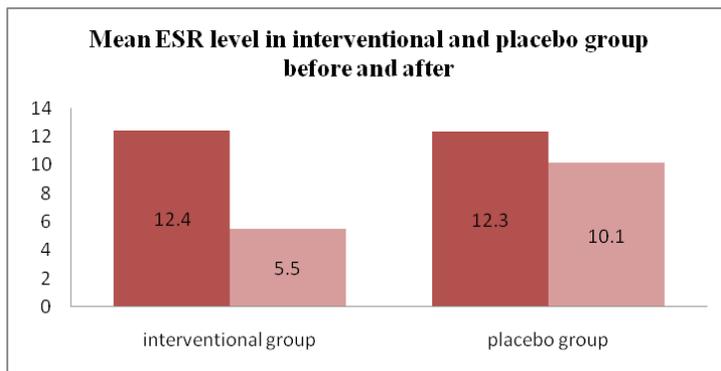


Figure 1: Mean ESR before and after intervention in both groups

ruption of mucosal barrier leading to occurrence of IBD among patients.⁶

The study was conducted to find out the association between vitamin D3 and inflammatory bowel disease.

Matrial & Methods:

The study was a randomized controlled trail with 1:1 ratio of two groups. The study was conducted in King Salman Armed Forces Hospital, Tabuk, Kingdom of Saudi Arabia. Ethical approval was taken from ethical review board. Consent forms were taken from all participants. The sample size of 50 patients was achieved with 80% power using two sided test and 5% significance level using WHO calculator. The interventional group was provided with 300,000 IU intramuscular vitamin D while the placebo group is given 1ml of saline. Both groups were followed for 4 months. Both the groups were measured for parathyroid hormone (PTH),

erthrocyte sedimentation rate (ESR) and serum level of 25 (OH)- vitamin D3 before and after intervention. Both gender and age greater than 18 was considered during inclusion process while patients with age less than 18, body mass index (BMI) less than 18.5 or greater than 32 kg/m2, pregnancy, breast feeding or taking any type of vitamin D3 in any form of medication were excluded. The study time period was one year (July 2015- July 2016). A pre-tested questionnaire was used for patient evaluation. After 4 months of follow up, the patients were evaluated for blood pressure, body temperature, heart rate, weight and height. Data was analyzed using SPSS software version 20.0. Descriptive statistics (percentages, mean, SD) was used to describe the data. Results were reported in percentages, tables and charts for different variables according to nature of variable. Chi square test was performed to observe the association between vitamin D3 and IBD.

Results:

Total 50 patients were observed 25 in placebo group and 25 in intervention group. The mean age of all the patient in intervention group was 33.5 with 9.0 SD while the mean age in placebo group was 35 with 8.2 SD. There were 66.4% males while 33.6% females in intervention group mean while there were 55.4% males and 44.6% females in placebo group. The mean duration of disease was 7.4 with 5.5 SD in intervention group while it was 7.7 with 5.4 in placebo group.

The study found out serum level before and after intervention was 8.15±0.41 and 9.65±0.51 in interventional group while it was 8.07±8.4 and 7.89±0.32 in placebo group respectively.

The study found out that serum hydroxyl vitamin D3 level in interventional group before and after was 32.3±0.67, 41.7±6.2 while in placebo group it was 33.9±8.9 and 34.8±9.6 respectively.

The serum parathyroid hormone level in interventional group before and after intervention was 33.3±15.3 and 21.5±7.8 respectively (p<0.001).While the serum parathyroid level before and after in interventional group was

36.7±13.0 and 33.4±10.6 respectively (0.17). The study found out weight of patients before and after intervention in interventional group 72.2±16.3 and 74.0±16.2 respectively (p=0.85) while in placebo it was 70.2±11.2 and 71.2±11.8 respectively (p=0.88). The systolic blood pressure before and after intervention in interventional group was 112.7±11.8 and 113.2±11.9 respectively (p=0.62) while in placebo group it was 114.9±10.7 and 114.7±8.2 respectively (p=0.47). The diastolic blood pressure before and after in intervention group 77.8±11.2, 75.8±8.2 respectively (p=0.18) while in placebo group it was 77.9±11.2 and 76.3±9.4 respectively (p=0.32).

Discussion:

The present study had explored the association between vitamin D3 and inflammatory bowel diseases. We observe that high dose of vitamin D is associated with increase in serum hydroxy 25 vitamin level and increase level of ESR that leads to reduction in inflammation. While the lower dose of vitamin D is associated with decreased level of hydroxy 25 vitamin and ESR level in body leading towards inflammation. Similar studies reported that vitamin D deficiency is associated with diabetes mellitus, inflammatory bowel diseases and multiple sclerosis.⁷

The present study find out that patients with higher doses of vitamin D had an improvement in their immune system while evidence exist that vitamin D deficiency is associated with greater rate of autoimmune disease occurrence and increase exposure towards infection. Studies proved that impact of vitamin D deficiency on immune system is due to occurrence of vitamin D receptors in immune cells that convert vitamin D into its active form.⁸

The present study found out that there was no significant difference in heart rate, blood pressure and body temperature of both group patients before and after intervention. While a similar study reported that the body temperature, heart rate and blood pressure remained stable before and after intervention because the patients were in remission phase of disease.⁹

Limitation: The study was of very short time period so that some important finding missed by researcher. The small sample size leads to less variation among respondent.

Conclusion:

Higher level of vitamin D3 is associated with prevention of inflammatory bowel diseases. Vitamin-D is playing a role of immune regulator in body and tends to improve bone and calcium homeostasis. The vitamin D3 deficiency leads to several gastrointestinal diseases including gut inflammation.

Conflict of interest: None

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Role and contribution of authors:

Dr Waseem Babur, Consultant Internal Medicine, Department of Medicine, King Salman Armed Forces Hospital, Tabuk, Kingdom of Saudi Arabia, Designing, data collection & analysis.

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Dr Tariq Mahmood, Specialist Internal Medicine, Department of Medicine, King Salman Armed Forces Hospital, Tabuk, Kingdom of Saudi Arabia, conception & acquisition of data.

Dr Anam Altaf, Department of Public Health, Eye Donors Organization, Wah Cantt Pakistan, final revision and critical evaluation of intellectual content.

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