

Research Article

Vitamin D3 serum level in patients with multiple sclerosis

Ghasem Fattahzadeh Ardalani¹, Alireza Khosravi^{2*}, Atefeh Mousavi-Ataeei³

¹Department of Neurology, School of Medicine, Ardabil University of Medical Sciences, Ardabil, Iran

²Department of Neurology, School of Medicine, Zahedan University of Medical Sciences, Zahedan, Iran

³General practitioner, School of Medicine, Ardabil University of Medical Sciences, Ardabil, Iran

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*Correspondence:

Dr. Alireza Khosravi,

E-mail: alirezakh25@gmail.com

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ABSTRACT

Background: The World Health Organization states that the prevalence of MS is increasing. Due to the growth in the number of people with MS, and because this disease involves the working youth community and is a debilitating illness and also there is no exact treatment for it, thus, eliminating the risk factors of this disease through new and cost-effective methods is essential. It has been proven that vitamin D3 performs an active role in the immune system. The role of vitamin D on the immune system is to increase phagocytic monocytes and to reduce secretion of TNF- α , IL-12 and PGE2 by monocytes. Vitamin D3 serum Levels in MS patients have had conflicting results in different studies. The Purpose of this study was to compare serum levels of vitamin D3 in patients with MS and healthy subjects, and also to examine the relationship between vitamin D3 serum levels and the severity and the number of attacks in MS patients during a year.

Methods: In this case-control study, 60 patients with MS were selected for case group and 60 healthy people, matched to the case group in terms of sex and living conditions, were chosen as the control group. Serum samples were taken for laboratory examination of vitamin D3 serum levels. Then, the collected data was analyzed by SPSS.16.

Results: Of samples 25% were male, and the rest of them were female. The mean age of the control group was 20 ± 4 years and that of case group was 19.3 ± 2.8 years. The prevalence of deficiency and inadequate levels of vitamin D3 was higher in MS patients than healthy people in the control group. Deficiency of vitamin D3 was higher among women in both groups. In MS group, prevalence of inadequate levels of vitamin D3 was 35.6% among women, while it was 13.3% among men. But in the control group, prevalence of inadequate levels of vitamin D3 was higher among men (40% versus 13.3%). The incidence of recurrence was 13.3%, 11.1% and 11.1% among MS patients with normal levels of vitamin D3, MS patients with inadequate levels of vitamin D3, and MS patients with deficiency of Vitamin D3, respectively, but the difference between them was not statistically significant.

Conclusions: Results showed that the serum levels of vitamin D3 are low in Ardabil province and even lower among women; and particularly in MS patients compared to healthy people. There was no significant relation between the number of attacks per year and serum levels of vitamin D3.

Keywords: Multiple sclerosis (MS), Vitamin D3, Serum level

INTRODUCTION

Multiple Sclerosis (MS) is a chronic, autoimmune disease with unknown etiology. In this disease, demyelination and axonal damage to CNS neurons cause physical and mental disabilities, and mostly affects young people and

business community. This disease incurs huge costs that health system has to pay. Despite medical advances in recent years there is still no definite cure for this disease.

According to the world health organization, MS incidence is growing all around the world, and its annual

incidence is estimated 3.6 and 2 persons per 100 people, in women and men respectively. The higher incidence rate of the disease in women continues to grow day by day compared to men, as such it is reported that the ratio has increased from 1.4 in 1955 to 2.3 in 2000.

The incidence rate of MS continues to be higher in women than man, and it even goes up day by day, as such the ratio has increased from 1.4 in 1955 to 2.3 in 2000. According to the MS Society's statistics, currently, 30 thousand patients are suffering from the disease in Iran.

Despite medical advances, MS is still the most common cause that cripples young people. Due to high growth and taking into account the fact that there is no definite cure for the disease, the prevention of the disease with new and economical ways seems necessary.

The disease is more commonly known as relapsing and recovery attacks. Several risk factors have been identified for MS that genetic is at one end of the spectrum and environmental factors are at the other. To mention some environmental factors we can refer to getting infected with EBV, smoking and low levels of vitamin D3. As it is proven, vitamin D3 serves an active role in the immune system.^{1,2}

Because of the difference in the levels of vitamin D3 in patients with multiple sclerosis, this study aimed to measure serum levels of vitamin D3 in patients with multiple sclerosis compared with healthy individuals.

METHODS

In this case-control study, 60 patients diagnosed with multiple sclerosis were chosen as the case group, and 60 healthy people were included in this study as the control group. The individuals in both groups were similar in terms of sex, age, living condition such as residential area and exposure to sunlight. Blood serum samples were taken from everybody to determine the level of vitamin D3 and information of all persons was obtained and registered in the checklist. The data were analyzed by SPSS V.16 using descriptive statistics and statistical analysis.

Exclusion criteria were presence of underlying disease, such as chronic renal failure, endocrine disease, receiving pulse corticosteroid therapy more than twice a year, recent use of steroids (in the past two months), consumption of cyclosporine and other drugs, and not being treated with vitamin D. The study was conducted after getting approval from ethics committee of the University and obtaining written consent from the patients.

RESULTS

Both groups included 15 men (25%) and 45 women (75 percent). The age range of people in both groups varied

from 15 to 40. The average age of the control group was 20 ± 4 years and the average age of case group was 19.3 ± 2.8 years. The prevalence of inadequate levels of vitamin D3 deficiency was 75% in patients with MS, and 55% in the healthy group. There was no significant difference between the two groups pertaining to the level of vitamin D3 (Table 1).

Table 1: Frequency distribution of vit. D3 by study groups.

Group	MS group		Control	
	N	%	N	%
Normal	15	25	27	45
Inadequate	18	30	12	20
deficiency	27	45	35	17.5
Total	60	100	60	100

In both groups, vitamin D3 deficiency among women were more likely than men either with multiple sclerosis or healthy. Differently put, 57.8 percent of women and 6.7 percent of men with MS were deficient in vitamin D3; similarly, 46.7 percent of women, and none of the men were deficient in vitamin D3 in the healthy group.

Related to inadequate levels of vitamin D3, 35.6 percent of women with MS had insufficient levels of vitamin D, while this amount was 13.3 percent among men in the group. However, the prevalence of inadequate vitamin D3 levels in healthy men was higher than in women (40 percent vs. 13.3 percent).

The statistical analysis showed that vitamin D3 levels among women and men were significantly different in both MS and control groups. In other words, the gender had no relation with vitamin D3 levels in the two groups (Table 2).

Table 2: Frequency distribution of vit. D3 by study groups and sex.

Sex	Male		Female		Total	
	N	%	N	%	N	%
Group						
MS						
Normal	12	80	3	20	15	25
Inadequate	2	10.1	16	88.9	18	30
deficiency	1	3.7	26	86.3	27	45
Control						
Normal	9	33.3	18	66.7	27	45
Inadequate	6	50	6	50	12	50
deficiency	0	0	21	100	21	35

The overall incidence of relapse was 11.7% in patients with MS, and 42.9% in MS patients with a deficiency of vitamin D3, showing no significant relationship between levels of vitamin D3 and MS relapse (Table 3).

Table 3: Prevalence of relapses in MS patients by vit. D3 level.

Group Vit. D3 levels	With relapses		Without relapses	
	N	%	N	%
Normal	2	28.6	13	24.5
Inadequate	2	28.6	16	30.2
deficiency	3	42.9	24	45.3
Total	7	11.7	53	88.3

DISCUSSION

In this study 25% of patients with MS had normal levels of vitamin D3 (80% of men and 66.6% of women) and 30 percent of them had insufficient levels of vitamin D3 (13.33 percent of men and 35.55 percent of women), 45% of them had vitamin D3 deficiency (6.66 percent of men and 57.77 percent of women).

On the contrary, in the control group 45% of patients had normal levels of vitamin D3 (60% men, and 40% of women) and 20% of them had inadequate levels of vitamin D3 (40% of men and 13.33% of women) and 35 percent were deficient in vitamin D3 (46.66% of the women). No significant relationship was obtained between levels of vitamin D3 and developing MS.

Shah-Beigy and colleagues in a study evaluated the serum levels of 25-hydroxyvitamin D in MS patients compared with the control group. They found that the mean serum level (OH) D 25 in patients with MS was $19.05\% \pm 2.4$, and in control group was 35.8 ± 8.8 . And the number of MS patients who lacked vitamin D or had inadequate levels of serum vitamin D was 76.7 and 6.7, respectively. This study also confirmed the relationship between vitamin D and MS, which is consistent with the results of our study and the low levels of vitamin D3 in patients of our study can be attributed to their less exposure to the sun.³

In a study by Munger et al., it was showed that those who had higher vitamin D through taking multivitamin supplements were significantly less affected by MS. Their study indicated vitamin D intake reduced the risk of MS to the extent of 40%.⁴

Hejazi et al., in a study examined dietary intake of vitamin D and 25 (OH) D3 serum levels in MS patients and healthy individuals, and revealed the prevalence of severe vitamin D deficiency in more than one-third of both groups (33% of patients, and 37% of healthy people). There was no significant difference between the two groups regarding 25 (OH) D serum levels.⁵

Ponsonby and colleague's study showed that the prevalence of MS had a reversed relationship with the amount of sunlight exposure; while the relationship between sunlight exposure and MS was even greater than

the degree of relationship between sunlight and malignant melanoma disease.⁶

On the other hand Soilu-Hanien and colleagues have reported no significant difference between MS patients and healthy people in terms of 25 (OH) D 3 serum levels in the winter season.⁷

Ozgocmen and colleagues, however, have shown that levels of 25 (OH) D 3 were lower in MS patients than healthy individuals.⁸

Kassandra and colleagues' study found 41% reduction in the risk of getting MS as 25 (OH) D 3 serum levels increased to the degree of 50 nmol/L in those with light complexion. Their finding approves the protective effect of vitamin D in MS disease through several mechanisms, such as preventing from production of antibodies and pro-inflammatory cytokines.⁹

Furthermore, during the MS patients' one year follow-up, no significant relationship was detected between the number of attacks per year and vitamin D3 level. About 28.6 of those with normal levels of vitamin D3 had recurrence over the past year. This rate was 28.6% and 42.9% in patients with inadequate levels of vitamin D3, and vitamin D3 deficiency, respectively. However, this difference was not statistically significant.

Samantha and colleagues in a study investigated the prevalence of vitamin D deficiency and bone mass loss in patients with MS. Within a 28-week protocol, they treated 12 patients, who were in their active stage of MS, with calcium (1200 mg daily) and vitamin D3 (700 to 7000 micrograms per week) supplements. The mean serum concentration of vitamin D was 78 nmol/L at the beginning that reached to 386 nmol/L at the end of the study. Although during this study, the disease's progress and activity was not affected, but the number of gadolinium-enhancing lesions per patient was reduced to a considerable extent.¹⁰

Deseilligny and colleagues in a study examined the relationship between serum levels of 25-OH-D and the incidence rate of relapse in MS patients before and after taking vitamin D dietary supplements. In this observation study which had no control group, 156 patients with relapsing-remitting MS, who had 25-OH-D serum levels less than 100 nmol/L, were treated with vitamin D3 supplements. While treating with supplements, the patients' 25-OH-D levels rose from mean level of 49 nmol/L in the beginning of the study to 110 nmol/L at the end. Integrating the collected data before and after taking supplements showed a strong inverse relationship between MS recurrence & 25-OH-D levels ($P < 0.0001$).¹¹

Several studies in Iran and Middle-Eastern countries have reported a high prevalence of vitamin D deficiency.^{12,13} In the present study, the number of people with vitamin D3 deficiency or insufficient levels of the vitamin was high

in both groups, especially in patients with MS, which indicates the vitamin D deficiency in most subjects.

A significant decrease in serum levels of vitamin D in MS patients compared to healthy people can show the consistency of this study with previous studies on the role of vitamin D and MS. This study was in line with studies undertaken in other parts of the world on the role of vitamin D and MS.

CONCLUSION

Based on the above findings, it can be claimed that vitamin D deficiency and inadequate levels of vitamin D was present in most cases studied, i.e., both in healthy subjects and in patients with MS. This rate was lower in men, indicating inadequate intake of vitamin D in the community. Vitamin D deficiency, especially in patients with MS was higher. About the lower level of 25 (OH) D in patients in comparison to healthy people, it can be said that vitamin D has a protective effect against autoimmune disease, i.e., MS. But the relationship between the number of attacks per year and vitamin D3 level was not significant. However, it is suggested that further investigation to be done. Considering the above mentioned points, and the decrease of 25 (OH) D serum level in MS patients, it is recommended that patients to use vitamin supplements or have more exposure to sun.

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