

Research Article

Analysis of Multiple Sclerosis using Serum level of vitamin D

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ABSTRACT

Multiple sclerosis (MS) is a potentially disabling disease of the brain and spinal cord (central nervous system). In MS, the immune system attacks the protective sheath (myelin) that covers nerve fibers and causes communication problems between your brain and the rest of your body. Eventually, the disease can cause permanent damage or deterioration of the nerves. Research over the years has shown that maintaining adequate levels of vitamin D may have a protective effect and lower the risk of developing multiple sclerosis (MS). A number of studies have shown that people who get more sun exposure and vitamin D in their diet have a lower risk of MS. Therefore, vitamin D supplementation is considered an important modifiable environmental risk factor for development of multiple sclerosis

50 newly diagnosed MS patients and 30 healthy counterparts who were the relatives of the patients were studied in two groups of case and control. The two groups were matched in terms of age, sex, time of sampling, shelter and nutrition. Serum levels of vitamin D, parathyroid hormone, calcium and phosphorus, was measured, recorded and analyzed.

The mean level of vitamin D in the case and control groups was respectively 27.33 and 27.98 ng/dl. The mean of PTH in the case group of 65.6 ng/dl. In the control group is 62.1 ng/dl. also during the study of serum level of calcium with an average of 9.17 ng/dl in the case group s and the average of 9.41 ng/dl in the control group, serum phosphate level with an average of ng/dl 3.59 and 3.37 ng/dl, respectively were calculated in case and control groups that was not showed a significant difference.

Keywords: Multiple sclerosis, Level of vitamin D, Control group, serum level of calcium

INTRODUCTION:

Vitamin D is a fat-soluble vitamin; its 2 main forms are ergocalciferol (vitamin D₂), which is of plant origin, and cholecalciferol (vitamin D₃), which is of animal origin. Vitamin D₂ is considered less bioactive than vitamin D₃.

Vitamin D can be obtained from food, such as fatty fish, fortified foods, and vitamin supplements. However, the diet provides only a small percentage of human vitamin D intake, and the main source is skin exposure to sunlight.

Total-body sun exposure easily provides the equivalent of 250 µg (10000 IU) vitamin D/d.⁸ In the skin, 7-dehydrocholesterol is photolyzed by ultraviolet radiation (UVR) from the sun and converted to pre-vitamin D₃, which is isomerized to vitamin D₃.⁹ The vitamin D binding protein transports vitamin D₃ through the blood to the liver, where vitamin D is hydroxylated by one or more cytochrome P450 vitamin D 25-hydroxylases, resulting in the formation of 25-hydroxyvitamin D₃ (25(OH)D₃).⁽²⁷⁾

Multiple sclerosis (MS) is a chronic inflammatory disease of the central nervous system (CNS) associated with demyelination, axonal loss and brain atrophy (1). It has been reported that more than two million individuals are affected all over the world (2). Multiple sclerosis reduces the lifespan by 5 – 10 years and is a frequent cause of neurological disability (3). Although the precise etiology of multiple sclerosis (MS) is unknown (4). Epidemiological studies suggest that environmental factors play a significant role in the development of multiple sclerosis. Epstein-Barr virus, smoking and vitamin D deficiency are the environmental factors that are most strongly associated with the risk of developing the disease (3). The geographic epidemiology of multiple sclerosis (MS) suggests that low vitamin D levels are a modifiable risk factor.⁽⁵⁾ In addition to its role in calcium and bone metabolism, vitamin D regulates cell proliferation and differentiation and can regulate immune responses (6). The required serum 25(OH)D is usually established by assessing the point where serum parathyroid hormone (PTH) starts to rise (7).

Iran is a country of high levels of sunshine which has previously been considered a low-risk MS region. However, Iran has recently observed an 8.3-fold rise in the incidence of MS between 1989–2006 (8).

Some studies have suggested that in a tropical country, there is no association between sunlight exposure and the risk of MS development, given the immunological effects of sunlight exposure

either through UV radiation or vitamin D metabolism (9).

The latitude gradient in MS has been questioned recently, which has thrown some researchers into doubt about the sunshine hypothesis (10).

Recently, solar related has been introduced geomagnetic disturbances (GMD) has been introduced as a potential environmental risk factor for multiple sclerosis (MS) (11).

In this study, serum levels of vitamin D and PTH in new MS patients and their relatives has been measured and compared with each other.

Several studies have shown that vitamin D levels are lower in MS patients than in controls. A recent study showed that in clinically isolated syndrome patients (namely, those suffering a single demyelinating attack that is compatible with MS), vitamin D deficiency was a predictor of developing clinically definite MS. The association of disease activity with vitamin D levels in MS patients has been evaluated in multiple studies that demonstrated a lower MS relapse rate in patients with higher levels of vitamin D.⁽¹⁶⁻²⁶⁾

MATERIALS AND METHODS:

50 new MS patients were studied in private hospital from jan2019-June2019. We have confirmed the diagnosis of multiple sclerosis patients by MRI and neurologist specialist and by using McDonald criteria in 2010.

50 people from first-group relatives of the patient also were selected as a control group. that in terms of age, sex were similar to under study group, the choice of control group from close relatives of patient was performed

Blood sample was taken from the patient and control person.

We have calculated Serum level of vitamin D, PTH, Ca and Ph was measured and recorded in patients and control group.

RESULTS:

Of the 50 patients who were evaluated according to existing criteria, 25 patients were female and 25

patients were male. Mean age of patients is 29 years old and control group is 32 years old.

The average of vitamin D in the case group was 27.33 ng/dl, whereas in the control was 27.98 ng/dl. There was not a significant difference between levels of vitamin D between the two groups.

The average of PTH of the patients was 65.6 ng / dl and average of control group was 62.00 ng/dl. There was not a significant difference between control and case groups.

Average of Ca in patients was calculated as 9.17 ng/dl and the control group as 9.410 ng/dl that according to the $P= 0.93$, a significant difference was not observed between level of Ca between the two groups.

The average of Ph was equal to 3.59 ng/dl and control was equal to 3.37 ng/dl due to $P= 0.34$ a significant relationship was not observed between control group and Patient.

Table 1. Laboratory characteristics of patients with multiple sclerosis and healthy control group

	Case (N= 50)	Control (N= 50)
	Mean (ng/dl) ± St deviation	Mean ± St deviation
Vit D	27.33 ± 14.96	27.98± 10.50
PTH	65.60 ± 30.65	62.00 ± 26.71
Ca	9.17 ± 0.33	9.41 ± 0.41
Ph	3.59 ± 0.50	3.37 ± 0.50

Average of vitamin D level in females and males was 27.17 and was 37.91 ng/dl, respectively. Blood level of vitamin D in the patient population in patients ranged mean 21.10 ng/dl. These values in the control group were mean 41.00 ng/dl.

Lack of vitamin D was defined due to the presence of PTH variable, so that lack of vitamin D is raised when the PTH is higher than 65 ng/dl. By calculating a lack of vitamin D with the above method, 50 cases vitamin had D deficiency of which cases the 30 patients were related to control group.

DISCUSSION:

The study consisted of 80 patients in this plan that Blood level of variables after securing the lack of vitamin D taking in 50 patients with MS with 30 people of the close relatives of patient were compared and compared as the control group. Of the 50 patients with MS, 25 people were female and 25 people were male. These values confirm the higher prevalence of MS disease among females that is consistent with previous conducted studies (12).

We had calculated the average of Vit D. Average of vitamin D level in females is 27.17 ng/dl and in males under study are 37.91 ng/dl that suggest lower level of serum level of this vitamin in females than males. This issue refers to possible impact of females' coverage or average level of life outside the home of women. Average level of vitamin D in the case group is 27.33 ng/dl and in control group are 27.98 ng/dl. That this issue suggests vitamin D deficiency in Iranian population that is confirmation of previous studies (8). There was no significant difference between level of vitamin D in patients with MS and control group, the number of studies are consistent with the results obtained (13 ,6 ,4) .Although there is no correspondence with the content of some articles. In some articles level of vitamin D in patients with MS has been reported lower than the control group that it may be attributed to methodology defect, none of the studies has not used from healthy relatives to control group which it may be causes environmental and genetic confounding factors on obtained results (15 ,14). Some studies suggest that for people who already have MS, vitamin D may offer some benefits. These benefits include lessening the frequency and severity of their symptoms, improving quality of life, and lengthening the time it takes to progress from relapsing-remitting multiple sclerosis to the secondary-progressive phase. But the evidence isn't conclusive. Vitamin D supplementation in people with MS appears to be safe but at high doses can lead to changes in

calcium levels. More research is needed to determine whether it's truly beneficial.

Experts also need to better understand how vitamin D might affect MS. When a person has MS, his or her immune system attacks the coating that protects the nerve cells (myelin). Research suggests that a connection between vitamin D and MS could be tied to the positive effects vitamin D has on the immune system.

As per our research there was no significant difference between PTH in patients with MS and control group. Meaningfulness of relationship between serum levels of Ca and Ph between the two groups of patients and controls was rejected, which it confirms previous articles (13).

In addition, vitamin D toxicity can lead to elevated levels of calcium in your blood, which can result in kidney stones.

CONCLUSION:

According to information obtained from study on new MS patients we found that values of vitamin D since the beginning of the disease in patients has no significant difference with healthy people. This issue suggests that may be other factors have a role on the development of MS including the specific gene or magnetic loads fluctuations. Lack of differences in the para thyroid hormone levels and normal range of bone mineral levels confirm the lack of difference between levels of vitamin D at two groups of people under study. Rejection of relationship impact of vitamin D with the disease onset of MS, Possibility of the influence of this vitamin deficiency does not reject in the process and MS relapses. Due to genetic effects and choosing control group of relatives of patient performing MRI and definitive rejection of MS in the control group was not possible; however, there was no clinical symptoms in the control group. In addition, low number of new MS patients was available for this study; thus, it was not possible to do a study in larger population.

Therefore, more investigations are recommended in this regard. Conducting study in the larger statistical population and different geographical

areas is suggested due to the impact of various factors on serum level of vitamin D.

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