Comparing Autoimmune Hypothyroidism Patients with Normal Subjects in Terms of Serum Vitamin D

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Abstract

Introduction Autoimmune diseases of the thyroid known as Graves and Hashimoto are the most common autoimmune diseases that vitamin D levels of these patients is different from that of healthy individuals. In this study, we examine vitamin D level in patients with Hashimoto's thyroiditis and compare them with the healthy group. Method This research is a case-control study. In this study, 65 patients with Hashimoto thyroiditis and 60 healthy people were randomly selected. Hashimoto thyroiditis patients diagnosed recently and not treated with any hormone were referred to laboratory to examine the 25-hydroxy-vitamin D and the results were analyzed using SPSS16. Results The results of this study showed that there is no significant difference between two groups of study and control in terms of variables such as age, height, weight, 25-hydroxy D3, BMI and TSH, and gender. Discussion and conclusion there is no correlation between 25-hydroxy D3 and TSH and Anti TPO, and most of other studies confirm this result.

Keywords: Autoimmune, Vitamin D, Patients.

Introduction

The main cause of the loss of integrity in the immune system that targets own cells in autoimmune diseases is not yet known. It is hypothesized that environmental factors, including those that stimulate endogenous inflammation trigger this autoimmune disease in patients who are genetically susceptible.

Autoimmune diseases are created due to disproportionate increase in inflammatory factors such as TNFα and IL1, IL6, and cytokines that are produced by macrophages and monocytes [1]. Vitamin D is a soluble prohormon in fat that enters body in the form of exogenous through diet and it is found at a significant amount in fish and medicinal supplements. The production of this vitamin in the body is possible by converting 7-dehydrocholesterol in the skin by ultraviolet radiation. It is converted to 25-hydroxy-vitamin in the liver D that is the main metabolite in its circulating. Then, it is converted through α1 to 25-dihydroxyvitamin D that is its active form [1, 2]. In various articles, the active form of vitamin has been referred as factor coordinating various cell activities. Binding to its receptor (VDR) in different tissues, this form not only controls the calcium metabolism, but also stimulates various cell activities and different biological responses, affecting cell growth, cell division, apoptosis, and immunity coordination. This hormone actives and deactivates inherent and acquired immunity [2].

Higher levels of 20 ng / ml of vit D3 (OH) 25 in most Labs are known as the normal level, while the secretion of parathyroid hormone in level lower than 30 ng / ml of vit D3 (OH) 25 in increases. This would indicate that normalized level of this vitamin in many laboratories is insufficient [1]. Vitamin D is considered as inexpensive and relatively safe supplement and due to anti-inflammatory its immune adjustment properties; it has been
recently considered and used widely. Recently, this theory has been proposed that vitamin D deficiency can be considered as a factor in developing autoimmune diseases and high levels of it could prevent these diseases [1]. Thyroid autoimmune diseases known as Graves and Hashimoto are the most common autoimmune diseases [2].

Hashimoto's thyroiditis disease is an autoimmune disease caused by the destruction of the thyroid gland in different degrees and through different mechanisms of immunity. It is diagnosed by an increase in thyroid antibodies in the serum. Auto antibodies, genetic predisposition, cytokines, and intracellular oxidative mechanisms lead to cell apoptosis and follicular destruction. Hypothyroidism in Hashimoto's thyroiditis occurs due to the destruction of the thyroid gland [3].

Antibodies of anti TPO and anti TG are clinical markers in thyroid autoimmune diseases, but any effect of them is due to secondary factor in increasing the immune response to them. Nearly 20% of patients with autoimmune hypothyroidism have antibodies against the TSH-R (TSH receptor) that inhibit binding of TSH [4-11]. The results of various articles about different levels of vitamin D in Hashimoto's disease compared to healthy subjects are inconsistent. Although in many articles, the relationship between low levels of vitamin D and Hashimoto have been reported [1], in some others, this relationship was not significant and it was even reverse relationship [2].

In reviewing the articles on the relationship between vitamin D and thyroid, only two studies were found by searching databases that the first study related to Marjan Mehr et al who investigated the effects of soy and vitamin D on serum levels of calcium and thyroid function in rats. In the rats receiving vitamin D3, hypercalcemia and reduced TSH occurred [5, 12-18]. In this study, we aim to examine the level of vitamin D in patients with Hashimoto's thyroiditis and compare it with the healthy group.

Method

This research is a case-control study. In addition, in this study, patient 65 and 60 healthy people were randomly selected and entered the study. Hashimoto's thyroiditis patients who had been diagnosed recently and not treated with any hormone were referred to laboratory in order to examine the level of 25-hydroxy-vitamin D. For every patient, one healthy person who did not meet the exclusion criteria and matched with the patient in terms of age and sex and BMI was considered as control. High level of anti TPO was considered for diagnosis of Hashimoto thyroiditis.

Exclusion Criteria:

- Patients with diabetes / other diseases of the thyroid / any chronic disease
- The history of cardiovascular disease / chronic kidney and liver disease
- Malabsorption disease / collagen vascular disease / metabolic bone disease
- Patients receiving vitamin D supplement in the past 6 months.

Patients were examined in terms of examinations and other tests such as weight / height / BMI / TSH / T4 / antiTPO / smoking / using alcohol and a positive family history of thyroid disease. Fasting blood sample of people was taken after 12 hours.

Information was entered into checklist and after removing the confounding factors between the two groups, the difference between the amount of vitamin D in two groups and its convergence with anti-thyroid antibody were investigated.

Finally, SPASS 16 software was used for data analysis.

Results

In this study, out of 125 subjects, 65 were patients and 60 were healthy subjects, which their descriptive statistics characteristics are listed in the table below.

<table>
<thead>
<tr>
<th>Table 1: Descriptive statistics in the form of mean and frequency for all participants in this study</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
</tr>
<tr>
<td><strong>Gender</strong></td>
</tr>
<tr>
<td><strong>Height</strong></td>
</tr>
</tbody>
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According to the results of t-tests and chi-squared test, there is no significant difference between the two groups in variables of age, height, weight, 25 (OH) D3, BMI and TSH, and gender. The correlation coefficient between 25-hydroxyvitamin D3 and TSH and Anti TPO is shown in the table below, which shows the lack of a linear relationship (correlation) between these variables.

Table 3: The correlation coefficient between 25-hydroxyvitamin D3 and TSH and Anti TPO

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pearson's R</th>
<th>p. value</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSH</td>
<td>0.008</td>
<td>0.94</td>
</tr>
<tr>
<td>Anti TPO</td>
<td>-0.142</td>
<td>0.25</td>
</tr>
</tbody>
</table>

Discussion and Conclusion

The main cause of the loss of immune tolerance in autoimmune diseases such as MS, RA and IBS is not known yet. A theory has been suggested that environmental exposures stimulating endogenous inflammatory exaggerate autoimmune factor in individuals who have predisposition. For unknown reasons, autoimmune diseases are more common among women than men, which is lower in women after menopause.

In general, autoimmune diseases are the third cause of disability in developed countries. Regardless of pernicious anemia and celiac sprue, there is no way to prevent autoimmune diseases currently. Autoimmune diseases are mainly treated by using corticosteroids and biological medications targeting TNF and inflammatory cytokines. Vitamin D that is obtained from foods, supplements or conversion of 7 dihydroergotamine corticosteroids Astro in skin by type B ultraviolet radiation is hydroxylated in the liver to 25-hydroxyvitamin D, which is the main circulating form of vitamin D. Vitamin D is a safe and cheap food supplement that has probably high anti-inflammatory effects. It has been suggested that lack of vitamin D as a factor triggering autoimmunity and its supplement values lead to prevention of autoimmunity, but the scientific results are contradictory. Health research agency has provided recently a study reviews the texts under title of role of vitamin D and calcium in improving the health. This study examined the various studies on the relationship between serum level of 25 (OH) D, 1, 25 (OH) D and various diseases including autoimmune diseases. In this study, papers used sunlight as a source of vitamin D as well as studies that used vitamin D supplement without knowing its serum level in body were removed.

In addition, cross-sectional and retrospective studies were excluded. After exclusion of these studies, no relationship was found between vitamin D levels and the prevalence of autoimmune diseases. (1). As Kregel mentioned in his review, while multilateral and immunity regulating role of vitamin D is considered increasingly, by excluding in vitro studies and results obtained from studies on animals, inadequate information and results remained to prove the theory of the relationship between Vitamin D and autoimmune diseases (2).
In a study conducted by Dellal et al in Turkey to examine the relationship between vitamin D Hashimoto's thyroiditis, levels of 25-hydroxyvitamin D and 1, 25 (OH) vitamin D in healthy subjects and patients with Hashimoto's thyroiditis were not significantly different (P = 0.09, P = 0.18). In addition, in their studies, they found no correlation between the anti-Tpo antibody and vitamin D levels in patients with Hashimoto's thyroiditis. In another study that Goswamin conducted about vitamin D deficiency and its relationship with autoimmune thyroid disease in the Asian people, no correlation was found between levels of vitamin D in healthy subjects and patients with autoimmune thyroid.

No relationship was also found between vitamin D levels and Antitpo and presence of Antitpo. In the study conducted by Effraimidis et al to compare positive antitpo patients with healthy subjects, no correlation was reported between two groups in terms of 25-hydroxyvitamin D and 1,25 (OH) vitamin D. In a study conducted by Della, vitamin D deficiency in thyroid patients was more than that in healthy people, but this difference was not significant among autoimmune disease (such as Hashimoto's and Graves) and non-autoimmune thyroid patients. In a study conducted in our center, similar to mentioned studies, no significant difference was found between levels of vitamin D in Hashimoto's disease and healthy individuals. However, in some studies such as Arrom-levin et al, significant difference was found between vitamin D deficiency in patients with autoimmune problems and healthy individuals (72% people versus 30% and P<0.0001). They also stated that low levels of vitamin D are associated with thyroid auto antibodies and abnormal function of the thyroid. In the study conducted by Twiq in India, very weak relationship was found between vitamin D levels and anti-thyroid antibodies (8). The differences in the results obtained can be due to different solutions used for thyroid disease, genetic differences, differences in the number of patients in different studies and differences in laboratory techniques.

In addition, we cannot eliminate several confounding factors such as viral infections in our studies, while it has been proven that these factors with various ways can cause thyroid autoimmunity. On the other hand, they can change the Vitamin D levels (4). On the other hand, high levels of 25-hydroxy-D cannot indicate higher impact of it on the receptor and target tissue. Since that study was a case-control retrospective study affected by selection of study groups, and there are many confounding variables in these investigations, different results obtained in articles can be justified. In most of these articles, the population size is low. On the other hand, the level of vitamin D in general population is low.

This caused that reduction distance of Vitamin D in patient group and control group decreases and this difference is not significant. By review of the studies, we realize that there is no prospective study about the use of vitamin D supplements and reduced risk of autoimmune diseases. Therefore, it is recommended that a prospective study to be conducted to evaluate the impact of the use of vitamin D and calcium on the incidence of autoimmune diseases.

References


