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Comparing the Serum Level of Vitamin D in Patients with Autoimmune Hypothyroidism and Control Group Subjects

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Abstract

Introduction: Hashimoto's thyroiditis disease is an autoimmune disease, occurs in various degrees through various immune mechanisms owing to degradation of thyroid gland. This theory has been proposed that vitamin D deficiency can exacerbate the autoimmune diseases, and its high levels can prevent these diseases. The objective of this study was to compare serum level of vitamin D in patients with autoimmune hypothyroidism and control group subjects. Methodology: In this case-control study, patients with Hashimoto's thyroiditis were referred to the lab to examine the 25-hydroxy vitamin D3 level. For each patient, one healthy subject, who had no exclusion criteria was considered as control and referred to lab for the experiments. Both groups were matched in terms of age, gender, and BMI. Patients' data were recorded in the checklist. SPSS software was used to examine the data. Results: The results revealed no significant difference between Hashimoto's thyroiditis and control group subjects in terms of age, gender, height, weight, 25-hydroxy D3 level (18.05 ± 16.13 versus 16.16 ± 12.67 ($p = 0.12$), and BMI. Investigations showed no significant convergence between serum level of 25 -hydroxy D and TSH and anti TPO levels. Conclusion: Although there is much evidence on the effectiveness of vitamin D in autoimmunity, including autoimmune thyroid, there is no relationship between serum level of vitamin D and TPO antibody.

Key words: Hypothyroidism, Autoimmune, Hashimoto, Vitamin

Introduction

Hashimoto's thyroiditis (HT) is the most common type of autoimmune thyroid disorder caused by immune system dysfunction, leading to immune attack to the thyroid gland. HT has a potential to affect various organs and tissues (Barić et al., 2018; Lv et al., 2018; Kırgız et al., 2018). It is estimated that HT disorders to affect about 5% of the population (Pyzik et al., 2015). An important characteristic of Hashimoto's thyroiditis (HT) is the penetration of lymphocytes in the thyroid gland, leading to serum antibody production against thyroid antigens, which in turn, it causes thyroid apoptosis and thyroid dysfunction (Pyzik et al., 2015). Despite the high prevalence of Hashimoto's thyroiditis (HT), the cause of this disease has not been fully recognized still. Various studies have proven the role of genetic factors in the progression of the disease, but the results of various studies suggest that the disease is caused by the combined effect of some of the sensitive genes and their interaction with environmental factors, in which more than one gene is involved (Ting et al., 2016; Walker & Sansom, 2014; Qiu et al., 2014).

HT can be diagnosed through increased thyroid antibodies in the serum. Autoantibodies, genetic predisposition, intracellular oxidative mechanisms and cytokines lead to cell apoptosis and follicular degeneration. Hypothyroidism occurs in Hashimoto's thyroiditis owing to thyroid gland degeneration (Dellal et al., 2013). Vitamin D is a relatively safe supplement and it has been recently been considered used widely owing to its anti-inflammatory properties. This theory has been recently proposed that vitamin D deficiency can exacerbate the autoimmune diseases and its high levels can prevent these diseases (Kriegel et al., 2011). The results of various studies on the differences in vitamin D level in Hashimoto patients and control subjects are controversial. Some studies have reported that vitamin D deficiency [25 (OH) D] causes HT and decreases thyroid antibodies (Kriegel et al., 2011), but some other studies have rejected such a relationship and reported that vitamin D deficiency does not cause this disease and there is even an inverse relationship between HT and vitamin D level (Agmon-Levin et al., 2012). Thus, there is still no general consensus on the effect of vitamin D deficiency on HT disease (Botelho et al., 2018; Ang et al., 2015; D'Aurizio et al., 2015). In a study conducted by Marjan-Mehr et al in Iran to evaluate the effect of soy and vitamin D on serum level of calcium and thyroid function in mice. Their study revealed that mice receiving vitamin D3 showed hypercalcemia and reduced TSH (Marjanmehr et al., 2011). As vitamin D level in healthy groups in Iran is lower than normal level in

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some cases this study was conducted to evaluate the level of vitamin D in patients with Hashimoto's thyroiditis and that in control group subjects

Methodology

In a case-control study, patients recently diagnosed with Hashimoto's thyroiditis and treated with no hormone, were referred to the lab to examine the 25- hydroxy level of vitamin D. For each patient, one healthy subject, who had no exclusion criteria was considered as control group and referred to lab for the experiments. Both groups were matched in terms of age, gender, and BMI. Patient data was recorded in the checklist. SPSS software was used to examine the data. Hashimoto's thyroiditis was diagnosed with high anti-TPO. Patients with diabetes, malignancy, other thyroid diseases, any chronic disease, history of cardiovascular disease, chronic kidney and liver disease, malabsorption, collagen and vesicular diseases, bone metabolic diseases, and patients treated with vitamin D supplementation over the last 6 months were excluded from the study .

Patients were examined in terms of other examinations and tests such as weight, height, BMI, TSH, T4, anti-TP, history of smoking, alcohol consumption, and positive family history of thyroid diseases. Antecubital blood samples were taken from the subjects after 12 hours of fasting for the tests. After removing the confounding factors, the data were entered into checklists and the difference of vitamin D level was examined in two groups and the degree of its convergence with anti-thyroid antibody was investigated. The control group included 50 hospital staff selected randomly and referred for the relevant tests. SPSS software was used to examine the forms' data. Quantitative data such as age, BMI, hormonal levels were reported in mean ± standard deviation and independent t -test was used for testing. Qualitative data were reported descriptively and Chi-square test was used for testing. Pearson's convergence analysis was used to examine the relationship.

Results

In this study, 125 patients were randomly divided into two groups (65 patients with Hashimoto's thyroiditis and 60 subjects as control). The results revealed no significant differences in two groups in terms of age, gender, height, weight, 25-hydroxy level of D3 and BMI among (Table 1).

Table 1: Demographic characteristics of the groups studied

		Studied group (n=125)	Hashimoto's patients group (n=65)	Control group (n=60)	p-value
Age		36.96±13.21	38.87±13.63	34.88±12.53	0.45
Gender	male female	15 110	10 55	5 55	0.22
Height		166.87±6.42	166.46±7.23	167.31±4.55	0.058
weight		70.81±10.51	72.21±10.11	69.30±10.81	0.85
25 -hydroxy D3 (ng/dl)		17.14±14.55	18.05±16.13	16.16±12.67	0.12
BMI		25.44±3.16	26.07±3.50	24.76±2.62	0.061
TSH	(µIU/ml)	7.43±9.77	12.22±11.65	2.24±0.85	<0.0001

The results of this study revealed no significant convergence between 25 -hydroxy D serum level and TSH and anti -TPO levels (Table 2) (Chart 1 and Chart 2).

Table 2: Evaluation of the level of convergence of 25-Hydroxy D serum level with Anti-TPO and TSH levels in patients

	Pearson's R	p.value
TSH	0.008	0.94
Anti-TPO	-0.142	0.25

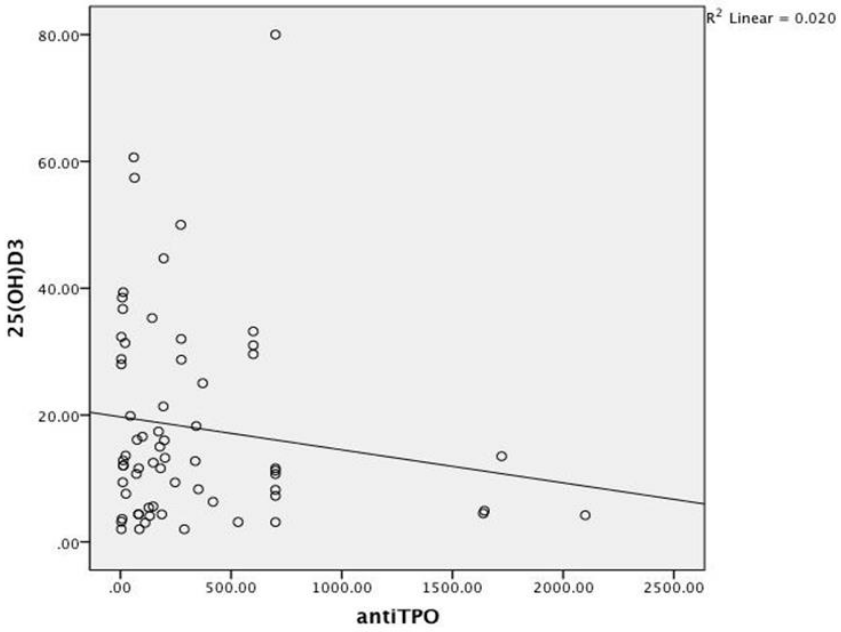

Chart 1: convergence level of 25-hydroxy D serum level with Anti -TPO levels in patients

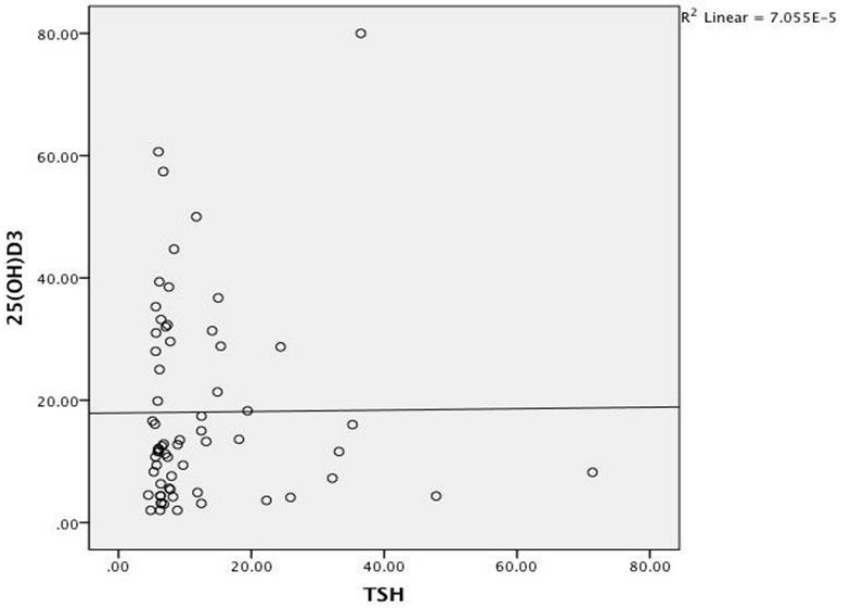

Chart 2: convergence level of 25-hydroxy D serum level with TSH level in patients

Discussion

Hashimoto's thyroiditis (HT) is a chronic autoimmune disease, which causes gradual loss of thyroid function and may occur with or without goiter formation (Shahbaz et al., 2018; Iddah & Macharia, 2013). It has now been recognized that genetic susceptibility, environmental factors, and immunity disorders contribute to its development (Hu & Rayman, 2016). Various studies have conducted on the effects of vitamin D deficiency on Hashimoto's thyroiditis (HT), but the results are contradictory and there is no general consensus on the effect of vitamin D on Hashimoto's thyroiditis (HT) (Botelho et al., 2018; Ang et al., 2015; D'Aurizio et al., 2015). In a study conducted by(Dellal et al.,2013) in Turkey on the relationship between vitamin D and Hashimoto's thyroiditis, 25-hydroxy vitamin D level and 1.25-hydroxy Vitamin D level were not significantly different in the control group and the Hashimoto group. Moreover, they found no significant relationship between the anti-TPO level and vitamin levels in patients with Hashimoto's thyroiditis .

In another study conducted by (Goswami et al., 2009) on the prevalence of vitamin D deficiency and its relationship with autoimmune thyroid disease in Asian Indians, no relationship was found between vitamin D levels in healthy subjects and the autoimmune thyroid group patients. In addition, no relationship was found between the vitamin D level and the anti TPO concentration and the presence of anti TPO. In the research carried out by Effraimidis et al., no relationship was found between healthy subjects and patients with positive anti TPO in terms of 1.25 -hydroxy vitamin D levels and 25-hydroxy vitamin D levels (Effraimidis et al., 2012). In the study conducted by Kivity, the prevalence of 25-hydroxy D deficiency level was higher in the thyroid group than that in healthy subjects, but this difference was not significant between autoimmune patients (including Hashimoto and Graves) and non-autoimmune thyroid patients (Kivity et al., 2011). In another study conducted by (Yasmeh et al.,2016), the results did not show an association between vitamin D deficiency and Hashimoto's thyroiditis (HT). Yasmeh et al reported that vitamin D deficiency was not observed in patients with Hashimoto's thyroiditis (HT) compared to the control group. In our study, as the mentioned studies, the difference in the 25-hydroxy D levels in the control and Hashimoto groups were not significant and serum level of vitamin D was not associated with the level of thyroid autoantibodies. In fact, the results of this study, as with results of other studies, show that despite much evidence on the effectiveness of vitamin D in autoimmune thyroid, no relationship was found between serum level of vitamin D and anti-TPO. In contrast, in another study conducted by (Agmon-levin et al 2012), they found a significant difference between patients with autoimmune thyroid problems and healthy subjects in terms of vitamin D deficiency. They also reported that low levels of vitamin D were associated with anti-thyroid autoantibodies and abnormal function of thyroid. In another study conducted by Ucan and et al, they reported that vitamin D deficiency is common in patients with Hashimoto's thyroiditis (HT) and treating patients with vitamin D may reduce the progression of hypothyroidism and also reduce cardiovascular risks in these patients (Ucan et al., 2016). The results of the study conducted by (Kim, 2002) were consistent with those of research conducted by (Ucan et al., 2016). The results of studies conducted by (Kim, 2002) showed that vitamin D deficiency is correlated with Hashimoto's thyroiditis (HT), and patients with Hashimoto's thyroiditis (HT) had vitamin D deficiency. However, the contradictory results can be discussed from several angles. First, it has been proven that many confounding factors, such as viral infections can lead to the autoimmune thyroid in different ways. In addition, these factors can change the levels of vitamin D, which they have not been considered in the studies (Bitetto et al., 2011; Belderbos et al.;, 2011). In addition, differences in the results might be attributed to presence of patients in various stages of thyroid disease, genetic differences, differences in the number of patients in different studies, and differences in laboratory diagnostic techniques. In general, it can be stated that despite the consistency of results of this study with those of similar studies, further studies with a larger sample size need to be conducted by controlling the confounding factors affecting the level of vitamin D in order to make the results more consistent.

Conclusion

The results of this research suggest that although vitamin D is non-significantly involved in autoimmune diseases, low levels of this vitamin cannot be attributed to incidence of autoimmune hypothyroidism.

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