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Assessment of Vitamin D Levels Among Hashimoto and Hypothyroidism Disease in Iraq, A Comparative Study

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Abstract

The thyroid gland is a small gland that regulates the body's metabolism. It secretes the hormones that the body needs to maintain this process. People of different ages may be afflicted with thyroid diseases, including Hashimoto disease and hypothyroidism. The current study aimed to compare the levels of vitamin D among patients with Hashimoto's disease and hypothyroidism coming to the Diabetes and Endocrinology Center in Al-Sadr Medical City in Najaf Governorate for the period between June 1, 2023, and January 1, 2024. Our current study included 30 pathological samples from people with Hashimoto's disease and 30 pathological samples from people with non-immune hypothyroidism. The concentration of Vitamin D was calculated by using the VIDAS technique and materials produced by the Etoile, France company. The results showed that the percentage of women infected with both diseases was greater than that of men, and the age group between 40–49 was the most frequent in both diseases. The results also showed that vitamin D levels in patients with Hashimoto's disease are lower than in patients with non-autoimmune hypothyroidism. The results were analyzed using the SPSS program, version 2022. We concluded from our study that thyroid diseases are more common among women compared to men, and that age is related to the disease. The level of vitamin D also plays an important role in determining the type of disease, as it has been recorded to be significantly lower in people suffering from autoimmune hypothyroidism (Hashimoto's).Compared with patients with non-immune hypothyroidism.

Keywords: Hashimoto disease, hypothyroidism, Iraq, vitamin D

INTRODUCTION

Vitamin D is a steroidal hormone-like vitamin that is necessary for development and growth. In recent years, researchers have focused on the role of this vitamin in regulating the body's immunity through the generation of B and T immune cells for the active compound of vitamin D, has an immune role because of the expression in its cells of hydroxylase (CYP27B1)-1 [1]. Vitamin D can be obtained directly through exposure to sunlight, so it is called the sunlight vitamin, or through food or taking nutritional supplements [2].

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At the present time, the problem of vitamin D deficiency is one of the prevelance problems in all countries of the world, despite the varying conditions in it, as the percentage of those who suffer from a deficiency of this vitamin reached 50% of the population, which necessitated intensifying research in this aspect in order to avoid its negative effects on the general health of man in all its age stages [3].

Where studies indicate that vitamin D deficiency is associated with a group of diseases that affect

humans, the most important of which are diabetes, blood pressure, and autoimmune diseases, as it plays a functional role in the body by regulating gene expression in positions that contain its VDR receptors, such as that found on endocrine glands [4].

Autoimmune thyroid diseases are among the most common autoimmune diseases, which include Hashimoto's thyroiditis and Krv's thyroiditis, which is caused by an immune defect that results in an anti-thyroid reaction [5].

METHODS: THE SITE AND TIME OF STUDY

The study was conducted on patients attending some private clinics in Al-Najaf Governorate during the period from February to June 2022.

Specimens Collection

This study involved 30 patients infected by Hashimoto's disease and 30 patients infected by hypothyroidism disease, whose ages of them ranged from 33 to 62 years, and 30 samples were for healthy people as control. The injured attended some private clinics in Al–Najaf through the time from February to June 2022 draw 5 ml from blood specimens from patients and put them in the test tube. The blood specimens were centrifuged to get the serum at 3000 rpm for 5 minutes. The serum specimens were stored at –20 ºC until measured vitamin D level was measured [6, 7].

Vitamin D Measurement

The concentration of Vitamin D was calculated by using the mini– vidas technique and materials produced by the company Etoile, France.

Statistical Analysis

SPSS version 22 is used to analyze the current study data. T–test used to compare between two groups, and ANOVA (one way) test used to compare groups that had been detached depending on the factors that were analyzed [8]. The skill of significance was put at $P \leq 0.05$. [2, 9].

RESULTS

The current study included 60 samples of patients with thyroiditis, distributed in two groups, each of which includes 30 samples, the first group for Hashimoto patients, and the second group for people with hypothyroidism where each group included (3) males and (27) Females. The results were compared to the control group consisting of 30 samples of healthy people (Tables 1 and 2).

Table 1. Show Study Groups with their Number.

	Observed N	**Expected N**	**Residual**
Hashimoto	30	30.0	.0
Hypothyroidism	30	30.0	.0
Control	30	30.0	.0
Total	90		

Table 2. Shows Distribution of the Study Groups According to the Sex of Patient.

Type of Disease	**Sex of patient**			**Total**
	Male		***Female***	
	Hashimoto	3	27	30
	Hypothyroidism	3	27	30
	6		54	60

The current study, which included patients distributed among the age groups (30–69) year, demonstrated that the age group 40–49 year is the most affected group, both for patients who suffer from Hashimoto disease (12/30) or hypothyroidism (15/30) (Table 3).

Table 3. Shows Distribution of the Study Groups According to the Age of Patient.

Type of Disease	Age of Patient				Total
	30–39	*40–49*	*50–59*	*60–69*	
Hashimoto	6	12	12	0	30
Hypothyroidism	0	15	12	3	30
Total	6	27	24	3	60

Our current study has proven that vitamin D plays a significant role in the incidence of autoimmune thyroid disease and hypothyroidism through calculating the Mean and standard deviation, Table 4, where it showed the significant effect ($p < 0.01$) of vitamin D on the type of disease. The study also showed that the patient's gender and age play a role In injury, as shown in Table 5, where the study recorded a very sharp decrease in the level of vitamin D in patients with autoimmune thyroiditis, compared to the control group, although the decrease occurred in patients with hypothyroidism, but it was less severe compared to the control group (Figure 1).

Table 4. A Comparison between the Study Groups According to Mean and Standard Deviation.

	Type of Disease	N	Mean	Std. Deviation	Std. Error Mean
Level of vitamin D	Hashimoto	30	6.7100	2.87082	.52414
	Hypothyroidism	30	23.0800	3.34678	.61104

Table 5. It Clarifies the Relationship between the Level of Vitamin D, the type of disease, the effect of age and sex on the type of injury.

	Level of Vitamin D	Type of Disease	Sex of Patient	Age of Patient
Level of Vitamin D Pearson Correlation Sig. (2-tailed) N	1 90	.937** .000 90	–287** .006 90	–464** .000 90
Type of Disease Pearson Correlation Sig. (2-tailed) N	.937 .000 90	1 90	–249** .018 90	–497** .000 90
Sex of Patient Pearson Correlation Sig. (2-tailed) N	–287** .006 90	–249** .018 90	1 90	–240* .023 90
Age of Patient Pearson Correlation Sig. (2-tailed) N	–464** .000 90	–497** .000 90	–240** .023 90	1 90

DISCUSSION

Hashimoto's disease is considered one of the autoimmune disorders which affect the thyroid gland and is responsible for producing hormones that help the body regulate many functions within it [10, 11]. This disorder occurs because the immune system attacks healthy tissues. The immune system attacks the cells that produce thyroid hormones, which lead to their destruction and thus a decrease in hormone production (Hypothyroidism) [12].

One of the vitamins that plays an important role in strength the immune system by protecting the body from many inflammatory diseases, autoimmune diseases, microbial infections is vitamin D. Many studies have shown that there is a relationship between deficiency of vitamin D and many diseases, such as diseases of the musculoskeletal system, cardiovascular system, kidney disease, diabetes, and the occurrence of infections [2, 8]. There are special receptors for vitamin D in the thyroid gland, along with other receptors called nuclear receptors [2, 9]. Many studies have proven that the deficiency of vitamin D is associated with various autoimmune diseases [13]. One of the autoimmune diseases that can affect adults and children is Hashimoto's disease. Many studies have found that Hashimoto's disease

has been linked to vitamin D deficiency because it can regulate pro–inflammatory cytokines and regulate the response of T cells, thus affecting the immune response. When there is an imbalance in the level of vitamin D in the body, such as its deficiency, this can lead to the occurrence of autoimmune diseases due to the deficiency in macrophages and their development, as well as reducing the development of CD4+ T cells, CD8+ T cells, and B cells [14]. There are also many studies that have shown that vitamin D is considered a selective immunosuppressant because it prevents or reduces the occurrence of autoimmune diseases, such as autoimmune thyroid diseases, systemic lupus erythematous, type 1 diabetes, and other autoimmune diseases [13]. It is believed that the cause of Hashimoto's disease is the effect of vitamin D deficiency on the thyroid gland.

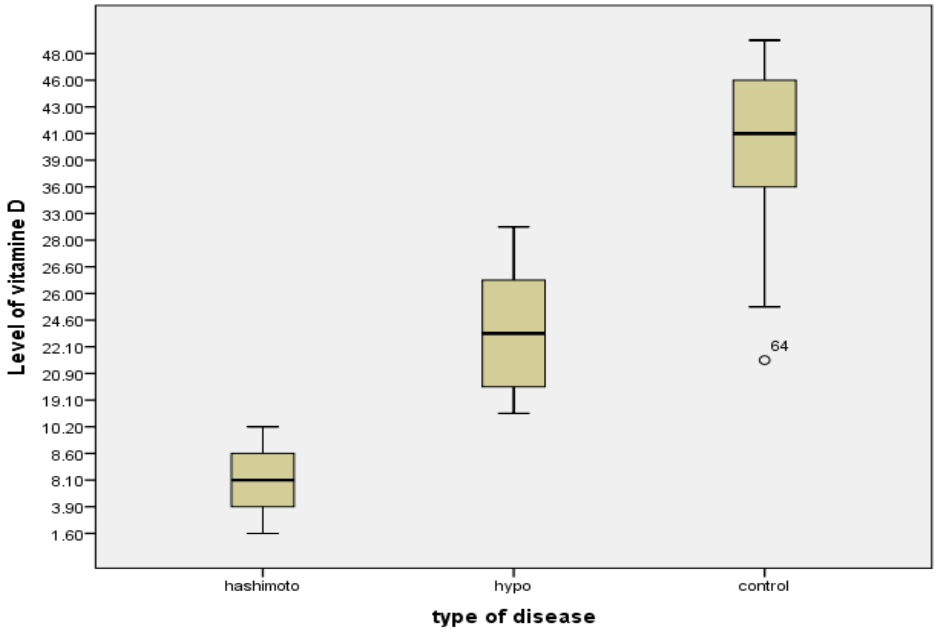

Figure 1. Shows the Level of Vitamin D in each of the Hashimoto Disease and Hypothyroidism Patients Compared to the Control Group.

Therefore, our aim in this study is to evaluate the level of vitamin D in patients with autoimmune hypothyroidism (Hashimoto's disease) and non-autoimmune hypothyroidism because there are not many studies comparing the level of vitamin D in autoimmune and non-immune hypothyroidism, or what is called physiological.

The results of this study showed that there is a deficiency in the level of vitamin D in patients with auto- immune and non- auto- immune hypothyroidism, but the rate of this deficiency was greater in patients with immune hypothyroidism. The current results agree with the study [13], that the reason for this is due to the association with a high level of autoantibodies (TGAb) with vitamin D[13].

Many studies have not adequately established the mechanism through which vitamin D can change the levels of thyroid hormones, such as TSH hormone. Experimental studies have shown that vitamin D has a direct effect on deiodinase 2, which catalyzes the activation of thyroid hormone a thisyme is necessary to convert T4 to T3 in target tissues [16]. The relationship between vitamin D deficiency and autoimmune thyroid diseases remains unknown.

The current study shows that females were more affected by thyroid disease than males. The reason is due to the difference in the anatomical body composition between males and females, as well as the physiological functions of women compared to men, which is the main reason for the increases the prevalence of thyroid diseases in women. Females go through more hormonal fluctuations than males,

starting from puberty and ending with menopause or reaching menopause, where the fluctuation of these hormones has a major impact on the thyroid gland, especially the pregnancy hormone and estrogen [17, 27]. The cause may also be X chromosome abnormalities and genetic variants. There are twenty-three pairs of chromosomes present in both males and females; twenty-two pairs are called autosomes, and one pair is called sex chromosomes. The sex chromosomes in males are XY, while the sex chromosomes in females are XX. The X chromosome is considered larger than the Y chromosome because it contains many genes, which constitute 5% of the total genes in the body, while the Y chromosome contains several genes less than 2% of the total genes in the body in human cells. Most of the genes associated with the occurrence of autoimmune diseases are located on the X chromosome, so women are more affected by autoimmune diseases due to mutations that occur in those genes located on the surface of the X chromosomes [20]. Also, the occurrence of autoimmune diseases is high in females because females have two pairs of X chromosomes, and inactivation occurs when the genes located on one of the two X chromosomes are silenced in each cell, which prevents the overexpression of genes. One of the X chromosomes, inherited from the mother in certain cells and from the father in other cells, is inactivated and this inactivation occurs random [18]. Therefore, it is not possible to identify the X chromosome that causes the increase in polymorphic antigens resulting from the predominance of paternal and maternal Which leads to the body attacking itself due to genetic variation [19].

The functions of the thyroid gland and the pituitary gland are affected by aging, as rates of autoimmune diseases increase, and this has been confirmed by previous research through the link between infection and a decrease in the level of the TSH [23]. While studies of the National Health and Nutrition Examination Survey (NHANES III) have confirmed that with increasing age, levels of TSH increase. Despite the lack of clinical signs of thyroid damage in societies that depend on iodine for their nutrition [24].

Physiological or pathological changes occur in the endocrine glands upon reaching old age, which leads to an increase in TSH levels without apparent pathological symptoms, such as a decrease in the level of testosterone in men and dehydroepiandrosterone sulfate and somatotropin in both sexes [21].

Disorders can occur for genetic reasons, as the natural immune system loses its ability to protect the body by fighting infections as one age [25].

Likewise, chronic infections and their continued stimulation of the immune system will lead to aging of the immune system.

Therefore, environments in which disease-causing factors are reduced have residents in good health and longevity Longest [22].

CONCLUSIONS

We concluded from our study that thyroid diseases that affect both males and females are more common among women compared to men, and the age plays a major role in this prevalence. Also, Vitamin D plays a role in determining the type of disease, as it recorded a noticeable decrease in people with immune-mediated hypothyroidism (Hashimoto's). compared to patients with non-immune hypothyroidism.

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