

**How to Cite:**

Altaee, H. A. A. (2022). The relationship between vitamin D and TPO antibody in Hashimoto's thyroiditis. *International Journal of Health Sciences*, 6(S6), 759–763. <https://doi.org/10.53730/ijhs.v6nS6.10440>

## **The relationship between vitamin D and TPO antibody in Hashimoto's thyroiditis**

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**Abstract**---Introduction: Hashimoto's thyroiditis is autoimmune disease that effect on thyroid gland tissue via penetration some special white blood cells (called lymphocyte) into thyroid gland and it is act to product specific antibodies act to damage the thyroid cells. Vitamin D is fat soluble vitamin, it is from steroid compounds derivatives and act after binding with its receptor in target cell. Vitamin D has many functions, but the important function is regulation factor on gene level, so it include in regulation of autoimmune diseases severity. Objective: This study aimed to explain the role vitamin D deficiency on severity of Hashimoto's thyroiditis via it's effect on TPO-Ab production. Method: The current study involved compare tow groups Hashimoto's thyroiditis with vitamin D deficiency as group 1 and Hashimoto's thyroiditis without vitamin D deficiency group 2. The serum specimens of all individuals used to measure anti TPO-Ab, T4, TSH and vitamin D levels via TOSOH instrument. Results: This study result's explain after comparison between Hashimoto's thyroiditis with vitamin D deficiency group and Hashimoto's thyroiditis without vitamin D deficiency group the elevation of anti- TPO-Ab levels with sever hypothyroidism in Hashimoto's thyroiditis with vitamin D deficiency group more than other group. Conclusion: The present study concluded to effect of vitamin D deficiency on severity of Hashimoto's thyroiditis via it's effect on TPO –Ab production.

**Keywords**---TPO –Ab, Hashimoto's thyroiditis, vitamin D deficiency.

### **Introduction**

Hashimoto's thyroiditis is disease classify as disorder autoimmune type suffered of the thyroid gland cells because some special lymphocytes diffusion into thyroid cells and it product auto-antibodies that act to disrupter of thyroid cells function. This type of disease can formed an all ages and occur with females more than males. The lymphocyte types that infiltrated into thyroid cells are T-cell and CD+

type 1 T helper cell, these types of lymphocytes can synthesis and product some of auto-antibodies for example thyroid peroxidase antibody (TPO - Ab). Production these auto-antibodies can appear various features like thyroid dysfunction (hypo-function), goiter and others (1). Also, T-cell and CD<sup>+</sup> type 1 T helper cell can cause dys-regulation of immune system responses between the CD<sup>+</sup> type 1 and 2 T helper cells, this condition support CD<sup>+</sup> type 1 T helper cell has role in autoimmune reaction as mediator at Hashimoto's thyroiditis. Progression of Hashimoto's thyroiditis disease is slow, so this disease is asymptomatic at early stage but can detect present of hypo-function of thyroid gland and TPO- Ab in blood via laboratory measurements (2).

Vitamin D is steroidal vitamin require specific receptor (called vitamin D receptor) for it's action in many of tissues. there are 2 sources of vitamin D are endogenous and exogenous sources, the endogenous vitamin D synthesis from cholecalciferol in cutaneous after exposure to sunlight, but the exogenous vitamin D source from foods. The vitamin D become active (called calcitriol) after metabolite it in liver then kidney via many of enzymes (3). Vitamin D has various functions in human body such as regulation of Ca level, promote the calcification of bone and there are many of studies demonstrate it role in regulation of genetic disease as non-skeletal function for example cancer and auto-immune diseases. Also. vitamin D act to regulate the specific gene expressions after bind with nuclear vitamin D receptors (4). This study aimed to explain the role vitamin D deficiency on severity of Hashimoto's thyroiditis via it's effect on TPO-Ab production

### **Material and Methods**

The current study involved compare tow groups (group 1: the cases suffer of Hashimoto's thyroiditis with vitamin D deficiency, group 2: the cases suffer Hashimoto's thyroiditis without vitamin D deficiency) as the study designation. Group 1 and 2 were involved 20 individuals selection for each group of both sex, the age of all individuals was more than 40 years and diagnosed them via use the American Thyroid Association (ATA) criteria (5). After all individuals in this study approves, blood specimen was draw and immediately separated by centrifuge without any anti-coagulation factor to obtain serum samples. These serum specimens used to measure anti TPO-Ab, thyroxin (T4), thyroid stimulating hormone (TSH) and vitamin D levels via TOSOH instrument. At statistic analysis was use t-test method and p-value to explain the significant values for parameters comparison (< 0.05 consider significant value ).

### **Results**

The present study explain various significant values between group 1 and 2 according to used t-test (mean + standard deviation (SD)) of many parameters: anti TPO -Ab, T4, thyroid TSH and vitamin D levels. Significant values included:

- Reduced the levels of vitamin D and T4 in group 1 compare with group 2 and obtain significant value for P-value.
- Elevated the levels of TSH and anti TPO-Ab in group 1 compare with group 2 and obtain significant value for P-value.

See table 1 and figure 1 below:

Table 1  
Comparison table of vitamin D, TSH, anti TPO-Ab and T4 levels in serum between Hashimoto's thyroiditis with vitamin D deficiency and Hashimoto's thyroiditis without vitamin D deficiency groups

Parameters levels (Mean + SD)	Hashimoto's thyroiditis with vitamin D deficiency (Group 1) (NO. 20)	Hashimoto's thyroiditis without vitamin D deficiency (Group 2) (NO. 20)	P-value
Serum T4 ( $\mu\text{g}/\text{dl}$ )	2.89 + 0.68	6.17 + 1.99	0.02 *
Serum anti TPO-Ab (U/ml)	65.5 + 6.89	23.0 + 4.02	0.01*
Serum vitamin D (ng/ml)	10.9 + 1.98	24.2 + 3.76	0.02 *
Serum TSH (mIU/ml)	7.06 + 1.02	4.1 + 0.98	0.03 *

\*Significant value

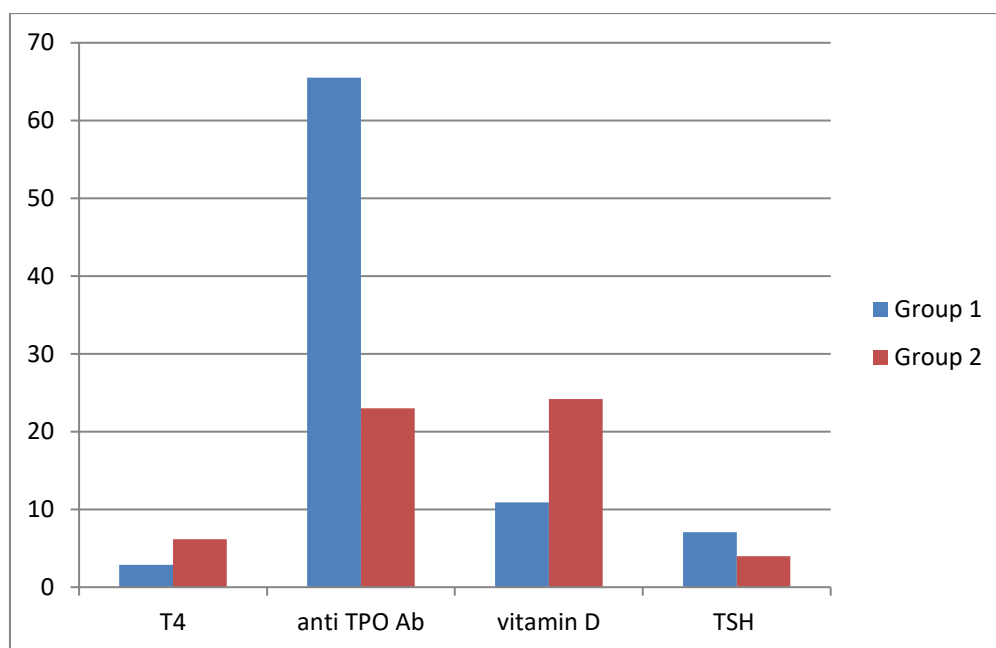


Figure 1. Comparison table of vitamin D, TSH, anti TPO-Ab and T4 levels in serum between Hashimoto's thyroiditis with vitamin D deficiency and Hashimoto's thyroiditis without vitamin D deficiency groups

## Discussion

Hashimoto's thyroiditis is autoimmune thyroid disease has many of features such as fatigue, constipation, obesity and other features. Pathology of Hashimoto's thyroiditis conclude for ability of the special lymphocytes to diffuse into thyroid

tissues and produce some antibody that it can destroy and damage the thyroid cells (6). Vitamin D is a steroidal molecule that has many functions in the human body, but the major function is to promote regulation of phosphate and calcium homeostasis. Also, vitamin D has a non-skeletal important role in gene expression regulation that can share in autoimmune disease formation. Many studies show the effect of decreased vitamin D on the progression of autoimmune disease, and the current study explains the role of vitamin D deficiency on the severity of Hashimoto's thyroiditis via its effect on TPO –Ab production (7).

Vitamin D converts to a biologically active form after binding to a specific vitamin D receptor, which is already present inside cells (intracellular) for example T lymphocytes, B lymphocytes, dendritic cells and macrophages that act to regulate these cell functions. The vitamin D acting in these cells promotes and regulates immune action, and vitamin D acts to support the inhibition of dendritic cell maturation and its secretion such as cytokines (interleukin 12 especially) (8). This condition can lead to the conversion and differentiation of T cells to TH2 phenotype. On the other hand, vitamin D has other actions that promote interleukin 10 production from dendritic cells and reduce inflammatory Th1 cytokine production such as interleukin 2. Inflammatory Th1 cytokines promote cell-mediated cytotoxicity that leads to the destruction of thyroid gland tissue in Hashimoto's thyroiditis. A decrease in vitamin D levels supports the destruction of thyroid gland cells via an increase in TPO –Ab production and finally the thyroid gland becomes hypo-functional (9). This comparative study confirms reduced vitamin D levels in serum in Hashimoto's thyroiditis cases and shows the role of the level of vitamin D in Hashimoto's thyroiditis development. These results agree with BEHERA, Kishore Kumar, et al. 2020, which showed the function and effects of vitamin D in Hashimoto's thyroiditis patients, also demonstrating that vitamin D plays a regulatory role in autoimmune disease gene regulation like Hashimoto's thyroiditis disease (10).

## **Conclusion**

The present study concludes to explain the role of vitamin D deficiency on the severity of Hashimoto's thyroiditis via its effect on TPO –Ab production.

## **Competing interests**

Dr. Hazim A. A. AlTaei is an employee of scientific consultants. All authors have declared that they have no other conflict of interest.

## **Author's contributions**

Dr. Hazim A. A. AlTaei contributed to the conception and the design of the study, acquisition of data, or analysis and interpretation of data and others.

## **Acknowledgements**

We would like to thank everyone who assisted this study.

**Funding:** No

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