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+ type 1 T helper cell can cause dys-regulation of immune system responses between the CD+ type 1 and 2 T helper cells, this condition support CD+ 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

<table>
<thead>
<tr>
<th>Parameters levels</th>
<th>Hashimoto’s thyroiditis with vitamin D deficiency (Group 1) (NO. 20)</th>
<th>Hashimoto’s thyroiditis without vitamin D deficiency (Group 2) (NO. 20)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serum T4 (µg/dl)</td>
<td>2.89 ± 0.68</td>
<td>6.17 ± 1.99</td>
<td>0.02 *</td>
</tr>
<tr>
<td>Serum anti TPO-Ab (U/ml)</td>
<td>65.5 ± 6.89</td>
<td>23.0 ± 4.02</td>
<td>0.01*</td>
</tr>
<tr>
<td>Serum vitamin D (ng/ml)</td>
<td>10.9 ± 1.98</td>
<td>24.2 ± 3.76</td>
<td>0.02 *</td>
</tr>
<tr>
<td>Serum TSH (mIU/ml)</td>
<td>7.06 ± 1.02</td>
<td>4.1 ± 0.98</td>
<td>0.03 *</td>
</tr>
</tbody>
</table>

*Significant value

**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 antibodies that it can destroy and damage the thyroid cells (6). Vitamin D is a steroidal molecule that has many functions in the process of human body, but the major function is 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 effect of decrease vitamin D on progression of autoimmune disease, current study explain the role vitamin D deficiency on severity of Hashimoto's thyroiditis via its effect on TPO–Ab production (7).

Vitamin D convert to biological active form after bound on specific vitamin D receptor, the vitamin D receptor present already inside of cells (intracellular) for example T lymphocytes, B lymphocytes, dendritic cells, and macrophages that it act to regulation of these cell functions. The vitamin D act in these cells is promote and regulate of immune action, vitamin D act to support the inhibition of dendritic cell maturation and its secretion such as cytokines (interleukin 12 specially) (8). This condition can lead to convert and differentiation of T cells to TH2 phenotype. On other hand, vitamin D has other actions are promote interleukin 10 that product from dendritic cell and reduce of inflammatory Th1 cytokines production such as interleukin 2. The inflammatory Th1 cytokines promote cell mediated cytotoxicity that lead to destruction of thyroid gland tissue at Hashimoto's thyroiditis. Decrease of vitamin D level support the thyroid gland cells destruction steps via increase of TPO–Ab production and at finally thyroid gland become hypo-function. (9). This comparison study confirm reduced vitamin D level in serum with Hashimoto's thyroiditis cases and show role the level of vitamin D at Hashimoto's thyroiditis development. These results agree with BEHERA, Kishore Kumar, et al. 2020 that showed also function and effects of vitamin D in Hashimoto's thyroiditis patients, also demonstrate that vitamin D play as regulation factor in autoimmune disease genes regulation like Hashimoto's thyroiditis disease (10).

**Conclusion**

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

**Competing interests**

Dr. Hazim A. A. AlTaee is employees of scientific consultants. All authors have declared that they have no other conflict of interest.

**Author's contributions**

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

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