Effect of Hashimoto Disease in Diabetic Patients in National Center for Diabetes

Abstract: The most two common autoimmune disease in endocrinology was Diabetes mellitus (DM) and thyroid dysfunction (TD). This study aimed to investigate the prevalence of TD in DM patients of type 1. The current study is carried out in the National Center for Diabetes of Endocrine and Genetic (NCDEG), AL- Mustansiriyah University, Baghdad. This study comprised of (36) patients with hypothyroidism diagnosed clinically under supervision of specialist physician in endocrinology. Their ages ranged between (30-40) years, among them there were 17 males (48%) and 19 females (52%). In addition there were (36) healthy control their age ranged between (28-42) years, among them there were 21 males (58%) and 15 females (42%). Results showed highly significant increase in the rate of Chol, TSH, T3, and TBS in patient group when compared with healthy subject (p<0.001), also highly significant decrease of T4 (p<0.001). The prevalence of thyroid dysfunction among type 1 DM patients is very high with hypothyroidism is being most common. This study recommended that screening of thyroid function must be done especially in uncontrolled diabetic patients.

Keywords: Type 1 Diabetes mellitus, Hashimoto disease, Thyroid hormones

1. Introduction

The most two common autoimmune disease in endocrinology was Diabetes mellitus (DM) and thyroid dysfunction (TD) [1]. Various studies have found association between them and this tend to coexist [2]. This study aimed to investigate the prevalence of TD in DM patients of type 1 and to find the correlation between thyroid profile and diabetes mellitus. Most of people have diabetes mellitus frequently have immune disease Hashimoto’s Thyroiditis (HT), in this type of disease thyroglobulin antibodies try to attach thyroid gland and the titers of thyroid peroxidase will increase following with increasing TSH specially if the patients without any medications and positive family history of the disease[3]. Various studies were approved association in different type like evidenced biochemical, genetic, and hormonal relations [4]. Hashimoto's thyroiditis has been investigated in this study to be associated with DM. People with HT develop hypothyroidism and this low level of thyroid hormones causes high levels of cholesterol, this can lead to cardiovascular diseases. Also untreated hypothyroidism lead to extreme form of hypothyroidism like myxedema coma, which is requires urgent medical treatment, so in this type of coma body’s functions slow to the point that it becomes threaten the patient life [5]. Various studies [6] explain why some people have autoimmune disease like HT, and this result from a combination two causes: genes and an outside trigger, such as a virus.

The incidence of HT is on the rise. Most cases diagnosed as hashimotos thyroiditis were in a hypothyroidism status. There was strong relationship between abnormal thyroid functions and cardiovascular disease, especially in hypothyroidism, this because high levels of cholesterol and hypertension even in hypothyroidism and hyperthyroidism have been related to increased risk of coronary heart disease [7].

2. Materials and Methods

This study is carried out in the National Diabetes Center Alyarmouk teaching hospital in Baghdad. Its comprised of (36) patients with hypothyroidism diagnosed clinically under supervision of specialist physician in endocrinology. Their age ranged between (30-40) years, among them there were 17 males (48%) and 19 females (52%). In addition there were (36) healthy control individuals their ages ranged between (28-42) years, among them there were 21 males (58%) and 15 females (42%),as shown in Table 1.

<table>
<thead>
<tr>
<th>Table 1: Number and age of patients and control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients (36)</td>
</tr>
<tr>
<td>male</td>
</tr>
</tbody>
</table>
Statistical analysis

Results were analyzed by using T-test SPSS version 21. P-value consider significant (p<0.05) and highly significant (P< 0.001).

3. Results and Discussion

Our results showed highly sig. increase in the conc. of Chol, TSH, T3, and FBS when compared with control (p<0.001), also there were highly sig. decrease in conc. of T4 (p>0.001) as shown in Table 2.

Table 2: Biochemical parameters between patient group and control.

<table>
<thead>
<tr>
<th>parameters</th>
<th>M ± SD</th>
<th>M ± SD</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>34.75±3.03</td>
<td>35.64±4.06</td>
<td>0.313</td>
</tr>
<tr>
<td>TSH</td>
<td>14.59±5.16</td>
<td>2.69±1.151</td>
<td>0.00</td>
</tr>
<tr>
<td>T4</td>
<td>41.04±15.47</td>
<td>107.37±23.33</td>
<td>0.00</td>
</tr>
<tr>
<td>T3</td>
<td>3.76±0.59</td>
<td>1.29±0.29</td>
<td>0.00</td>
</tr>
<tr>
<td>FBS</td>
<td>189.89±35.101</td>
<td>89.94±6.67</td>
<td>0.00</td>
</tr>
<tr>
<td>Chol</td>
<td>336.97±60.36</td>
<td>164.89±10.36</td>
<td>0.00</td>
</tr>
</tbody>
</table>

The comparison of biochemical parameters between female only of patients and control groups were clarified in the Tables (3a) and (3b), there were highly significant difference in all parameters.

Table 3a: Comparison of only female (patients and control)

<table>
<thead>
<tr>
<th>female</th>
<th>TSH</th>
<th>T4</th>
</tr>
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<tbody>
<tr>
<td>mean</td>
<td>15.194</td>
<td>2.566</td>
</tr>
<tr>
<td>SD</td>
<td>5.890</td>
<td>1.133</td>
</tr>
<tr>
<td>P-value</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>max</td>
<td>30.20</td>
<td>4.50</td>
</tr>
<tr>
<td>min</td>
<td>6.80</td>
<td>.80</td>
</tr>
</tbody>
</table>

In Tables (4)a and (4)b the comparison of biochemical parameters between male only in patient and control groups, there were highly significant difference in all parameters except T3, there were non-significant increase between patients and control groups.

Table 4a: Comparison of only male (patients and control)

<table>
<thead>
<tr>
<th>parameters</th>
<th>M ± SD</th>
<th>M ± SD</th>
<th>P-value</th>
</tr>
</thead>
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</tr>
</tbody>
</table>

There was antagonist effect between T3, T4, and TSH with insulin, this indirectly potentiate the insulin action. The synthesis of thyroid releasing hormone (TRH) were decreases in diabetes mellitus. These are the main reason responsible of low levels of thyroid hormones in diabet patients. Generally, TSH reading above normal means a person has hypothyroidism [8]. Thyroid stimulating hormone levels were increased highly sig. in type 1 diabetic patients when compared with healthy subjects (p<0.001). hypothyroidism observed in the results of the present study and this in accordance with the results of [9,10] This study found and recommended that thyroid screening is essential among DM patients in order to detect hypothyroidism and this in the same line of study of Aziz [11]. Abnormal levels of thyroid hormones may be the outcome of many medications receiving from DM patients.
example, insulin is an anabolic hormone, and it
enhances the levels of T4 and suppresses the
levels of T3 by make inhibition of hepatic
conversion of T4 to T3. In addition, oral
hypoglycemic like phenylthioureas known to
suppress levels of T4 and T3, in the same time it
causes to raised levels of TSH [12]. Type 1 DM
patients were on insulin injection and also on oral
hypoglycemic agents, firstly this explain the
finding of the results of this study of abnormal
thyroid hormones levels in diabetic patients
(p<0.001), secondly due to modified of the
synthesis and release of TRH also it may be
depend on the status of glycaemia in DM patients,
that is to mean: insulin is the most affecting factor
on glycaemic status which is regulate TSH and
TRH levels. There is an inhibitor, Thyroid
hormone binding inhibitor (THBI), responsible of
conversion extra thyroid enzyme (5-deiodinase)
of T4 to T3, this attributed to hypothyroidism and
also the hypothalamo pituitary thyroidaxis
dysfunction. These statuses aggravated and prevail in
DM patients especially poorly controlled diabetics [13]. There are two
mechanisms that DM influence thyroid function:
the first one when hypothalamic control the
release of TSH, and the second mechanism
happened in the at peripheral tissue through
converting T4 to T3. In case of Hyperglycaemia
the following alteration occurs:

1. Reduction in hepatic concentration of 5-
deoiodinase enzyme.
2. Low levels of T3.
3. Increasing of levels of reverse T3.
4. Low, normal, or high level of T4.

This mean that the metabolism in diabetes
mellitus change in thyroid dysfunction. The
association between diabetes mellitus and thyroid
dysfunction is repeatedly proven in internal
medicine, which is clear evident. Hypothyroidism
and hyperthyroidism chiefly consider disorder in
thyroid function, although the tow status belongs
to the same organ (thyroid gland) but the
difference in pathophysiology as well as clinical
picture are clear. Researchers investigate the
interface between thyroid malfunction owing to
DM, literatures discuss that endocrinial
dysfunction causes stimulation of a serious
reactions which are actually in nature
antihomeostatic. Like, hypoadrenalism and
hypopituitarism exhibits strong association with
hypothyroidism and consequently DM [14].
Hashimoto’s thyroiditis(HT) is common in
women than men specially in age 30 to 50 years
old. Although this disease occurs in young or
adolescent women. This agree with the present
study. Various studies [15] suggests that the most
causes of this disease was gene or genes and they
working to be passed from one generation to the
next. In study of Caucasian populations have
IDDM is equally prevalent among both gender
(male and female), the gender distribution
suggests that risk factors does not have relation
with IDDM but it associate with HT. In addition,
we can see the gender specific factors explain
the highly observed prevalence of other
autoimmune diseases among hypothyroid cases
have HT, most of them were women. Stratified
analyses showed a statistically significant
difference for men, but not women. Generally
diabetic women, were more likely to have other
autoimmune diseases, whereas men with HT
appeared to be predisposed to these disorders.
The gender-specific risk factors is the explanation
that are responsible for a high prevalence of these
disturbance in women than men. That is mean
the detect of HT is easy in men because they have
low risk to infect the disease [16].
Hashimoto thyroiditis generally manifests in two
phases clinically: the first phase is a hyperthyroid
and the second one is euthyroid phase.in the case
of hypothyroid due to either iodine intake or to
disorder of the immune system like silent
thyroiditis and postpartum. While the second
phase is asymptomatic and sometimes lasting for
decades [15].
This results observed highly significant increase
of cholesterol in hypothyroid patients and this
consider as risk factor for cardiovascular diseases.
The risk of coronary heart disease (CHD) and
other forms of atherosclerotic vascular disease
rises with rising plasma cholesterol levels.
Although there is no clear evidence that
hypothyroidism causes coronary artery disease,
but hypothyroidism increases the oxidation of
cholesterol, which presents substrate for oxidative
stress [16]. Study of Bayar Qasim [17] in a case
control study showed that total cholesterol level
was statistically higher among hypothyroidism
diabetic patients in comparison to non-diabetic
(p<0.001) and this is coincided to this study.
The present study shows association between
patients have hypothyroidism according to T3
andT4 and dyslipidemia (Chol. Levels) and this
agree with the results of Brenta [18], which also
find the same results. About 75% of total
cholesterol was produced from liver cells. Special
protein was necessary to activate thyroid
hormones receptors, this regulate the expression
of special protein. Thyroid hormones affect by
their indirect action to modify regulation of
insulin and catecholamine through expend the
basal ene The metabolism of the body be slow
when the thyroid gland underactive and this will decrease the ability of liver to remove the cholesterol from circulation. When liver ability to remove cholesterol from circulation decreases, the cholesterol levels will be high and this consider as a sign of a hypothyroidism [20]. The liver responds to high levels of cholesterol by production of receptor bad from cholesterol LDL receptors and sit on the cell surface and begin attach cholesterol in the blood as it filters through the liver. The filtered cholesterol converted into bile acids that used to synthesis hormones and other substances [21].

Conclusion
The conclusion of this study was found that there were a strong relationship between thyroid disorders and diabetes mellitus that is lead to classical risk factors such as dyslipidemia, which can also lead to cardiovascular risk in these patients. The screen test for thyroid gland among those patients with should be routinely be done.

5. References
### Table 5: Correlations between all the parameters

<table>
<thead>
<tr>
<th></th>
<th>Gander</th>
<th>Age</th>
<th>TSH</th>
<th>T4</th>
<th>T3</th>
<th>FBS</th>
<th>Cholesterol</th>
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<td>-.11</td>
<td>-.039</td>
<td>-.302</td>
<td>-.311</td>
<td>.037</td>
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<td><strong>Age</strong></td>
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<td>.404</td>
<td>-.504</td>
<td>.105</td>
<td>-.312</td>
<td>.169</td>
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<td>.404</td>
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<td>-.621</td>
<td>-.095</td>
<td>-.143</td>
<td>-.116</td>
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<td>Pearson Correlation, Sig. (2-tailed)</td>
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<td>-.621</td>
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<td>.078</td>
<td>.285</td>
<td>.057</td>
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<td>-.095</td>
<td>.078</td>
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<td>.038</td>
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<td>-.143</td>
<td>.285</td>
<td>.038</td>
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<td>-.162</td>
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<td><strong>Cholesterol</strong></td>
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<td></td>
<td></td>
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<tr>
<td>Pearson Correlation, Sig. (2-tailed)</td>
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<td>-.116</td>
<td>.057</td>
<td>.178</td>
<td>-.162</td>
<td>1</td>
</tr>
</tbody>
</table>

*. Correlation considered significant at the 0.05 level (2-tailed).

**. Correlation considered significant at the 0.01 level (2-tailed).