Thyroid Autoimmune Antibodies For Enzyme Peroxidase, Thyroglobulin and Se, Zn Levels in Elderly Patients with Hypothyroidism in Iraq

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ABSTRACT

Forty – two elderly hypothyroidism patients and forty – two apparently healthy as control groups, divided to (21) male (M) and (21) female (F) also (21) control male C(M) and (21) control female C(F) aged > 60 years, were tested for the presence of thyroid peroxidase autoantibody (TPo – Ab) and thyroglobulin autoantibody (Tg – Ab), also for Se and Zn levels in their sera.

The results revealed a significant increase in (TPo – Ab) and (Tg – Ab) for group (M) and (F) compared to control group, also a significant increase in TPo Ab and Tg Ab for (F) compared to (M) was found.

Significant decrease in Se and Zn level for (M) and (F) compared to control group, while no significant difference between (M) and (F).

In conclusion serum (TPo – Ab and Tg – Ab) levels were higher in female patients than in male patients specifically in older than 60 years also Se and Zn levels were lower for both patients group compared to control.

INTRODUCTION

Hypothyroidism is one of the common disease of the thyroid gland, this conclusion is diagnosed by low free T4 level and / or high TSH level in primary hypothyroidism [1]. It is an autoimmune disease of the thyroid gland which is often associated with enlargement of the thyroid gland (Goiter) [2]. Thyroid peroxidase (TPo) is a 107,000 MW membrane – bound glycoprotein with a heme prosthetic group that catalyzes oxidation of iodide within tyrosine residues on thyroglobulin in the synthesis of T3 and T4. Thyroid peroxidase is new generally Thyroid autoimmune antibodies for enzyme Peroxidase, Thyroglobulin and Se, Zn levels in elderly
recognized as the principal autoantibody protein in thyroid microsomes and known as thyroid antimicrosomal antigen \[3\]. Thyroglobulin (hTg), a water soluble glycoprotein with a molecular weight of approx 660,606 dalton. Is the principal constituent of the thyroidal colloid sharing about 75% of its mass. Synthesis of the thyroid hormones T\(_3\) and T\(_4\) is based on the oxidative iodination of tyrosine residues of the thyroglobulin molecule within the cell \[4\]. Thyroglobulin is transported by the microsomes. In serum of patients with autoimmune thyroid disease (ATD) autoantibodies to thyroglobulin (TGA) microsomal thyroid fraction (TMA) and thyroid peroxidase enzyme (TPO) are frequently present \[5\]. Both trace elements and thyroid hormones play essential roles in human body e.g., iodine, iron, selenium and zinc \[6\]. Selenium is a potent antioxidant, an integral part of the body natural antioxidant glutathione peroxidase system, and also helps to boost the immune system \[7\]. Selenium play a role in type 1 and type 2 iodothyronine deiodonase, the enzymes responsible in humans for the conversion of T\(_4\) to the active form T\(_3\) are aselenoenzymes \[8\]. Zinc is essential component of many important enzyme, it plays an important role in protein synthesis, regulation of gene expression, moreover zinc stabilized the structure of protein and nucleic acid \[9\]. The role of zinc in thyroid hormone peripheral metabolism is still being elucidated; however, preliminary evidence suggests this nutrient might play an important role \[10\]. However the interaction between trace elements and thyroid hormone are often controversially given so in order to make clear the influence of thyroid hormones on the homeostasis of selenium and zinc in primary hypothyroidism elderly male and female. There are little information about the relation between TPO-Ab and Tg-Ab in thyroid dysfunction patients. So this study was carried out to verify the relation between these parameters.

**MATERIAL AND METHODS**

Samples of blood were collected from hypothyroidism patients at the specialized center of endocrinology and diabetes Alkindy hospital – during 2007.

Forty two elderly > 60 years olds (21) female (F) and (21) male (M) diagnosed by the elevation of TSH and the reduction in free T\(_4\) and free T\(_3\) in addition to (42) apparently healthy individual > 60 years as female control C(F) and male control C(M). The serum was obtained by
centrifugation of blood at 2500 (rpm) for (10 min). This serum was stored at (-20 c) unless used immediately.

- Determination of thyroid stimulating hormone (TSH), free tri-iodothyronine (FT3), and free thyroxin (FT4) using enzyme – linked immunosorbent assay (ELISA) [11].

- Determination of (Anti – Tpo) and (Anti – Tg) is indirect solid phase enzyme immunometric assay (ELISA) designed for the quantitative measurement of lgG class autoantibodies directed against thyroid peroxidase (Tpo), called microsomal antigen [12], [13].

- Determination of selenium and zinc were performed using flame atomic absorption spectrophotometer method [14].

- Statistical analysis were preformed use data presented were the means and standard deviations, student- t test was used to compare the significance of the difference in the mean value of any two groups ( P ≤ 0.0001) was considered statistically significant [15].

RESULTS AND DISCUSSION

From the results in table (1) serum TSH in male patients is (15.5 ± 3.5) μIU / mL , female patients (16.15 ± 4.11) μIU / mL and male control (1.8 ± 0.12) μIU / mL ,female control (1.9 ± 0.11) μIU / mL .

serum FT3 in male patients is (0.79±0.21) Pg/mL ,female patients (0.85±0.36) Pg/mL and male control(2.4±0.26) Pg/mL ,female control(2.3±0.25) Pg/mL and serum FT4 in male patients is (0.60±0.03) ng/mL,female patients(0.46±0.02) ng/mL and male control(0.98±0.09) ng/mL,female control(0.95±0.07) ng/mL.

The significant elevation in TSH levels for both patients group compared to control in duct primary hypothyroidism in addition to the significant reduction in FT4 and FT3 of male and female patient groups compared to control, some studies showed a prevalence of (1.4 – 1.9) % overt hypothyroidism in women , with progressive increase with age ; prevalence in male was 10 – fold lower [16]. Serum TSH values were higher in women than in men and showed higher dispersion in women as well as in old age . serum FT3 was found to be higher in women than in men and increased with age[17].

Serum TSH gradually decreases with age, whereas after age 60 , serum FT4 increase possibly because of the development of thyroid autonomy after longstanding borderline sufficient iodine intake [18].

Table(2) and Figure (3) showed the levels of (TPo – Ab) and (Tg – Ab) in all studied groups . The levels of (TPo – Ab) for ( C(M),C(F),
M, F) were (50 ± 8.2) IU/mL, (48 ± 10.1) IU/mL, (110 ± 27.3) IU/mL, (190 ± 26.2) IU/mL respectively. A significant increase of (TPo – Ab) for (F) and (M) compared to C(M), C(F) are shown, also a significant increase in (TPo – Ab) for (F) compared to (M) was found. Thyroid microsomal (TPo) autoantibodies occur in sera of most autoimmune thyroid disease patients and predict raised serum TSH levels in random populations [19]. Hypothyroidism was related to (TPo – Ab) titres of > 200 KU/I and thyroid hormone levels varied with age and sex [17].

From the table (2) the levels of (Tg – Ab) for (C(M), C(F), M, F) were (65 ± 15.2) IU/mL, (63 ± 16.0) IU/mL, (125 ± 25.05) IU/mL, (210 ± 30.8) IU/mL respectively. A significant increase of (Tg – Ab) for (F) and (M) compared to C(M), C(F) are shown, also a significant increase in (Tg – Ab) for (F) compared to (M) was found. Thyroid peroxidase autoantibodies (TPo – Ab) are of pathological importance because they are present in the majority of Hashimoto thyroiditis patients and correlate with the active phase of the disease unlike thyroglobulin autoantibodies (Tg-Ab), they may damage thyroid cells by complement fixation. The detection of thyroid peroxidase autoantibodies (TPo – Ab) and thyroglobulin autoantibodies (Tg – Ab) and the measurement of thyroid stimulating hormone, has been used in determining the diagnosis and management of autoimmune thyroid disorders [20][21].

The prevalence rates of (TPo – Ab) and (Tg – Ab) were similar (13.1 vs 13.0 %). Both antibodies were more frequent in females than in males, and in females the prevalence rates increased with age. It could be due to a general alteration in the immune system, whereas specific antigenic mechanisms are probably of less importance [22]. The highest anti(Tpo-Ab) concentrations were found in untreated hypothyroid Hashimoto’s thyroiditis, but no simple relationship between anti (TPo – Ab) levels and thyroid function was observed [23]. The occurrence of Anti – Tg and Anti – Tpo autoantibodies at the same time seem to be related to their functional association, TSH acts in stimulating synthesis and release of thyroid hormones in close cooperation of all the proteins. Persisting inhibition of the peroxidase activity by specific autoantibodies (Anti – Tpo Ab’s) causes a decrease in the synthesis of thyroid hormones and thus hypothyroidism [24].

Table(3) and figure (4) showed serum levels of Se and Zn in all studied
groups. Se levels in (C(M), C(F), M, F) were (0.099 ± 0.005) μg/mL, (0.097 ± 0.004) μg/mL, (0.045 ± 0.013) μg/mL, (0.042 ± 0.014) μg/mL respectively, a significant decrease in Se level in (M) and (F) compared to control while no significant differences between (M) and (F).

Low T₃ syndrome and has been correlated with a decrease in serum selenium. Evidence suggests a strong linear association between lower T₃ / T₄ ratio and reduced Selenium status, even among individuals considered to be thyroid based on standard laboratory parameters, this association is particularly strong in older subjects and is thought to be a result of impaired peripheral conversion[25][26].

A study conducted on over 1000 men and women over the age of 60 years showed that selenium has a protective effect of (Se) against hypothyroidism and thyroid tissue damage and no association between thyroid volume and (Se) was found in men which suggest that (Se) protect against (Goiter) also protect against autoimmune thyroid disease[27]. A study performed on hypothyroidism showed that the (Se) content in male and female were not significantly different[28]. There was no difference in (Se) between hypothyroidism patients and healthy volunteers nor in selenoperoxidase[29].

From the table (3) the level of Zn for (C(M), C(F), M, F) were (1.02 ± 0.051) μg/mL, (1.01 ± 0.08) μg/mL, (0.90 ± 0.05) μg/mL, (0.92 ± 0.08) μg/mL respectively, a significant decrease in Zn level in (M) and (F) compared to control, while no significant difference between (M) and (F), the role of zinc in thyroid hormone peripheral metabolism is still being elucidated; however, preliminary evidence suggests this nutrient might play an important role in stabilizing serum T₃ and T₄, since zinc is not a cofactor in hepatic type 1-deiodinase enzyme, the nature of zinc’s influence on aspects of peripheral metabolism in animals and humans remains unclear[30]; in a study conducted 124 elderly patients (60 male) and (64 female) no significant difference were found between males and females (Se) levels but all these patients are situated at the lower limit of range of normality[31] the zinc content of normal group was higher than that of the hypothyroid group, also negative correlation was found between Zn and TSH level[28].

Conclusion serum (TPO_Ab) and (Tg_Ab) levels were higher in female patients than in male patients specifically in older than 60 years also Se and Zn levels were lower for both patients group compared to control.
Table 1: TSH, FT3, FT4 level in sera of all studied groups.

<table>
<thead>
<tr>
<th>No</th>
<th>Group description</th>
<th>FT3 ng/mL mean ± SD</th>
<th>FT4 ng/mL mean ± SD</th>
<th>TSH MIu/mL mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>C(M)</td>
<td>0.98 ± 0.09</td>
<td>2.4 ± 0.26</td>
<td>1.8 ± 0.12</td>
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<td></td>
<td></td>
<td>P &lt; 0.0001</td>
<td></td>
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</tr>
<tr>
<td>21</td>
<td>C(F)</td>
<td>0.95 ± 0.07</td>
<td>2.3 ± 0.25</td>
<td>1.9 ± 0.11</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P &lt; 0.0001</td>
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</tbody>
</table>

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Table 2: TPo – Ab and Tg - Ab levels in sera of all studied groups.

<table>
<thead>
<tr>
<th>No</th>
<th>Group description</th>
<th>TPo – Ab IU/mL mean ± SD</th>
<th>Tg - Ab IU/mL mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>C(M)</td>
<td>65 ± 15.2</td>
<td>50 ± 8.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P &lt; 0.0001</td>
<td></td>
</tr>
<tr>
<td>Group</td>
<td>Se (μg/mL)</td>
<td>Zn (μg/mL)</td>
<td></td>
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<tr>
<td>C(M)</td>
<td>0.90 ± 0.05</td>
<td>0.045 ± 0.013</td>
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<tr>
<td></td>
<td><strong>P &lt; 0.0001</strong></td>
<td><em><em>P</em> &gt; 0.05</em>*</td>
<td></td>
</tr>
<tr>
<td>C(F)</td>
<td>0.92 ± 0.08</td>
<td>0.042 ± 0.014</td>
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</tr>
<tr>
<td></td>
<td><strong>P &lt; 0.0001</strong></td>
<td><em><em>P</em> &gt; 0.05</em>*</td>
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</tbody>
</table>

P* statistical difference between (M) and (F).

Table 3: Se and Zn levels in sera of all studied groups.

**P** statistical difference between (M) and (F).
REFERENCES


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