Measurement of paraoxonase-1, visfatin levels in Iraqi diabetic and diabetic with hypothyroidism

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ABSTRACT

Introduction and Aim: This study is to evaluate the levels of paraoxonase-1 and visfatin in diabetic and diabetic with hypothyroidism patients and to discover the relationship of paraoxonase-1 and visfatin levels in these patients.

Materials and Methods: The study included 35 subjects in control group (G1), 35 with diabetes (G2), and 35 diabetics with hypothyroidism (G3), aged ranging 25-50 years for all the study groups and BMI with (20.5-25.4) Kg/m². Serum and whole blood were used for estimating F.B.S., HbA1c%, lipid profile, T4, TSH, paraoxonase-1 and visfatin.

Results: The results revealed a significant elevation in F.B.S., HbA1c%, TC, TG, VLDL and LDL in G2 and G3 compared to G1. The HDL levels showed a significant decrease in G2, G3 compared to G1. Also, showed significant reduction in T4 in G3 compared to G2 and G1. A significant elevation in TSH in G3 compared to G2 and G1 and a significant decrease in paraoxonase-1 but increase in visfatin for G3 more than G2 when compared to G1 were observed.

Conclusion: The study concluded that paraoxonase -1 and visfatin are suggestive reliable markers for the diagnosis of thyroid disorder in diabetics with hypothyroidism depending on their relation with T4 and TSH.

Keywords: Paraoxonase-1; visfatin; diabetic; hypothyroidism

INTRODUCTION

Hypothyroidism is the most well-known issues of the thyroid organ. Thyroid hormones have marked effects on glucose homeostasis. As it is realized that glucose intolerance is related with hyperthyroidism, and more as of late it was shown that hypothyroidism is related with insulin opposition, which it’s pathological state where the objective cell neglects to react to customary degrees of flowing insulin bringing about inability to keep up ordinary glucose and lipid levels in circulation (1).

Paraoxonase (PON) is a protein having both paraoxonase and aryl esterase activity. It hydrolyzes fragrant carboxylic corrosive esters and certain organo-phosphorous pesticides, particularly paraoxon and nerve gas. Plasma paraoxonase action in human populace exhibits polymorphic dissemination because “of an amino acid exchange in the active site in enzyme”, bringing about reduce, moderate or highly activity isoenzymes (2).

Paraoxonases-1 were initially found as enzymes hydrolyzing organophosphate compounds, for example, insect poison paraoxon. There are three individuals from paraoxonases-1 family right now known as paraoxonase-1, paraoxonase-2 and paraoxonase-3, which are encoded by three separate qualities on a similar chromosome-7 (human) or chromosome - 6 (mouse)“. PON1 protein each of the three human individuals from the family are (70%) indistinguishable at nucleotide level and (60%) indistinguishable at the amino corrosive level. PON-1 (EC 3.1.1.2) which comprises of (354) amino acids with atomic mass (43 k Da) is a calcium-subordinate glycoprotein that is available bound to HDL particles (3).

Changes in the human paraoxonase-1 quality have been related with maturing and illnesses of the cardiovascular, endocrine, anxious and gastrointestinal (4). A potential component for these aggregates might be identified with HDL-reliant and free cell reinforcement properties of Paraoxonases-1 and its impacts on degrees of hydroperoxides and platelet actuating factor, which may likewise influence oxidative pressure in tissues (5).

Visfatin is perhaps the most bountiful adipocytokines as of late found with the ability to adjust a few capacities (6). Visfatin that ties to insulin receptor however at an unexpected restricting site in comparison to insulin itself. The affinities of visfatin and insulin for insulin receptors are comparative.
However, coursing visfatin focus is at any rate multiple times lower than that of insulin. The molecular mechanisms uncovered that visfatin initiates intracellular course for insulin signaling, including “tyrosine phosphorylation of the insulin receptor and insulin receptor” just as downstream actuation of protein kinase B. The study showed insulin-mimetic impacts of visfatin, for example, expanded glucose take-up in adipocytes and myocytes, concealment of hepatic glucose discharge, invigorated fatty oil collection, and expansion in its union in pre-adipocytes. Study showed that each of visfatin and insulin vie for the insulin receptor, raising the theory that visfatin could have a limiting site not quite the same as that of insulin. Expanded visfatin levels are related to coronary artery disease (CAD) and acute coronary syndromes even after amendment for exemplary cardiovascular danger factors like cholesterol, smoking, hypertension, diabetes, and stoutness (7).

MATERIALS AND METHODS

This study included 105 individuals with ages ranged 25-50 years and BMI ranged between 20.5-25.4 Kg/m². Samples were partitioned into three gatherings: bunch (1) comprises of (35) as a control. Patients were divided into two groups: Group (2): consists of 35 diabetic patients. Group (3): consists of (35) diabetic with hypothyroidism.

Ten milliliters of blood were collected after an overnight fasting from all subjects by venipuncture, who attended the Al-Yarmouk Teaching Hospital in Iraq during the period from January 2021 to March 2021. A liqueate of (0.5 ml) of whole blood was used in determination of HbA1C%. The other part was left at 37°C for (15 minutes) to clot then centrifuged at (4000 rpm) for (15 minutes). Serum obtained was frozen until analysis for F.B.G, lipid profile, thyroid hormones, paraoxonase and visfatin.

HbA1C was determined by a bromate affinity assay traceable to the IFCC reference method (8). Total serum cholesterol was determined utilizing a kit based on the enzymatic hydrolysis (9). The absorbance was recorded for the quinonimine (red complex) at 500 nm. The TG determination based on the enzymatic hydrolysis (10). HDL levels were determined in the supernatant which obtained after centrifugation according to the based method (11). LDL and VLDL were determined by using Friedewald’s formula (12):

\[
LDL = \text{Total Cholesterol} - (HDL + VLDL)
\]

\[
VLDL (mg/dL) = TG/5
\]

Thyroid hormones, paraoxonase and visfatin were determined using ELISA technique based on the sandwich method. All parameters were expressed as (mean ± SD). T-test was used for comparison among the four studied groups. The P-values >0.05, < 0.05 and < 0.001 were considered statistically NS, S and HS, respectively.

RESULTS

The results in Table 1 illustrated the F.B.G, HbA1C%, lipid profile, T4 and TSH levels for all groups. The results showed significant increase in F.B.G, HbA1C%, lipid profile in patient group (G2, G3) when compared to G1. Results also showed a significant reduce was found in high density lipoprotein in G3 when compared to G1, while no significant was found in G2 compared to G1 in HDL levels.

In Table 2 the results illustrated the thyroxin (T4) and TSH levels in the studied groups. Decrease in thyroxin in G3 was observed when compared to G1. While highly significant increase was found in thyroid stimulating hormone in G3 when compared to G1.

Table 3 shows PON-1 and visfatin levels for all groups. Results showed a significant decrease found in PON-1 in G3 and G2 when contrasted to G1, the results revealed significant elevated in visfatin levels in G2, G3 compared to G1.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>G1</th>
<th>G2</th>
<th>G3</th>
<th>G2 vs G1</th>
<th>G3 vs G2</th>
<th>G3 vs G1</th>
</tr>
</thead>
<tbody>
<tr>
<td>F.B.G (mg/dL)</td>
<td>97.22 ± 6.33</td>
<td>181.5 ± 24.98</td>
<td>240.07 ± 46.7</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>HbA1C (mg/dL)</td>
<td>5.33 ± 0.485</td>
<td>8.4 ± 1.068</td>
<td>10.99 ± 1.52</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>TC (mg/dL)</td>
<td>146.16 ± 28.91</td>
<td>229 ± 9.83</td>
<td>253 ± 25.55</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>TG (mg/dL)</td>
<td>109 ± 17.8</td>
<td>240 ± 41.7</td>
<td>302 ± 87.2</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>HDL (mg/dL)</td>
<td>45.59 ± 8.8</td>
<td>40.45 ± 8.36</td>
<td>23.5 ± 5.32</td>
<td>NS</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>LDL (mg/dL)</td>
<td>92.2 ± 25.4</td>
<td>129.1 ± 20</td>
<td>167.1 ± 20</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>VLDL (mg/dL)</td>
<td>21.8 ± 3.56</td>
<td>48.0 ± 8.34</td>
<td>60.4 ± 17.44</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
</tbody>
</table>

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Table 2: Parameters for groups one, two, three

<table>
<thead>
<tr>
<th>Parameters</th>
<th>G1</th>
<th>G2</th>
<th>G3</th>
<th>T-Test G1 vs G2</th>
<th>T-Test G1 vs G3</th>
<th>T-Test G2 vs G3</th>
</tr>
</thead>
<tbody>
<tr>
<td>T4 (mg/dL)</td>
<td>83.4±8.450</td>
<td>78.21±11.90</td>
<td>46.71±16.50</td>
<td>S</td>
<td>HS</td>
<td>S</td>
</tr>
<tr>
<td>TSH (mg/dL)</td>
<td>2.45±0.411</td>
<td>0.94±0.08</td>
<td>16.43±5.027</td>
<td>S</td>
<td>HS</td>
<td>HS</td>
</tr>
</tbody>
</table>

Table 3: Descriptive parameters for control and patient groups

<table>
<thead>
<tr>
<th>Parameters</th>
<th>G1</th>
<th>G2</th>
<th>G3</th>
<th>T-Test G1 vs G2</th>
<th>T-Test G1 vs G3</th>
<th>T-Test G2 vs G3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paraoxonase1 (ng/dL)</td>
<td>138.4 ±20.7</td>
<td>109.5 ±12.9</td>
<td>67.9 ±51.6</td>
<td>NS</td>
<td>HS</td>
<td>S</td>
</tr>
<tr>
<td>Visfatin (ng/dL)</td>
<td>14.85 ±2.3</td>
<td>23.06 ±3.29</td>
<td>29.67 ±5.27</td>
<td>S</td>
<td>HS</td>
<td>S</td>
</tr>
</tbody>
</table>

DISCUSSION

Diabetic dyslipidemia includes a triad of increased triglycerides, decrease HDL and excess of small, LDL particles, which is in agreement with this study. The dyslipidemia is found in diabetes patients due to insulin resistance. People with type 2 diabetes, metabolic disorder and the consolidated dyslipidemia, cardiovascular risk is raised by a clustering of risk factors such as abdominal obesity, debilitated fasting glucose, elevated blood pressure, low HDL-C, elevated TGs and a raised in LDL particles. The current expansion in the frequency of type 2 diabetes in the populace maybe represents the direst cardiovascular danger (13).

DM Type 2 and hypothyroidism are the two most common endocrine issues. Hypothyroidism is most frequently induced by an autoimmune system. In our study we discovered contrasts in the commonness of hypothyroidism in the general population compare with type 2 diabetic mellitus, an association that builds the danger of cardiovascular illness.

This study showed gigantic adverse impacts of unmistakable hypothyroidism on paraoxonase -1 levels contrasted with control groups these findings compare with a new report that displayed a connection between hypothyroidism with huge rises in the inflammatory biomarkers that predispose to cardiovascular complications (14). Hypothyroidism patients in this study related to critical diminishing in paraoxonase -1 levels, as upheld by Azizi et al., study showed an abatement in the paraoxonase -1 level and is associated with fundamental hypothyroidism, whilst Milionis et al., revealed insignificant contrasts in PON-1 levels in patients with essential hypothyroidism contrasted with healthy group (15).

This study reveals levels of visfatin in overt hypothyroidism could be a compensative mechanism in response to hyperglycemia aiming to decrease the functional effect (16).

CONCLUSION

Based on our results estimation of paraoxonase -1 and visfatin is suggestive to be a reliable marker as well as can used on effective diagnostic of thyroid disorder on patients suffering from diabetic with hypothyroidism depending on the significant relation for paraoxonase-1 and visfatin with T4 and TSH.

CONFLICT OF INTEREST

Authors declare that there is no conflict of interest for this study.

REFERENCES


