Keywords: Thyroid profile, Total cholesterol, Triglycerides and LDL

Introduction

It is well known that alterations in thyroid function result in changes in the composition and transport of lipoproteins. In general, overt and subclinical hypothyroidism is associated with hypercholesterolemia mainly due to elevation of low density lipoprotein (LDL) cholesterol levels, whereas high density lipoprotein (HDL) cholesterol concentration is usually normal or even elevated. On the other hand, hyperthyroidism (both overt and subclinical) is accompanied by a decrease in serum levels of total, LDL and HDL cholesterol. These changes in the lipid profile are explained by the regulatory effect of thyroid hormones on the activity of some key enzymes of lipoprotein metabolism. Specifically, the thyroid hormone stimulates the hepatic de novo cholesterol synthesis by inducing the 3-hydroxy-3-methylglutaryl-coenzyme A (HMG-CoA) reductase that catalyzes the conversion of HMG-CoA to mevalonate, the first step in the biosynthesis of cholesterol. This results in an enhanced intracellular cholesterol concentration in hyperthyroidism and a decreased one in hypothyroidism. Additionally, thyroid hormones activate the LDL receptors; the promoter of the LDL receptor gene contains a thyroid hormone responsive element (TRE) which allows the triiodothyronine (T3) to upregulate the gene expression of the LDL receptor. Moreover, thyroid hormones stimulate the cholesteryl ester transfer protein (CETP), an enzyme which transports cholesteryl esters from HDL2 to the very low density lipoproteins (VLDL) and triglycerides in the opposite direction. Finally, thyroid hormones stimulate the lipoprotein lipase (LPL), which catalyzes the triglyceride-rich lipoproteins, and the hepatic lipase (HL), which hydrolyzes HDL2 to HDL310.

Materials and Methods

A cross-sectional study was conducted on 100 patients with suspicion of thyroid disorders were taken as cases. One hundred patients with normal thyroid profile and no history of other chronic diseases were taken as control group. Results: The serum TC, TG and LDL levels in hypothyroid individuals (both overt and subclinical) were significantly higher than euthyroid subjects but the levels were comparable between hyperthyroid and euthyroid group. Conclusion: Dyslipidemias are associated with thyroid disorders, so biochemical screening for thyroid dysfunction in all dyslipidemic patients. Therefore, patients presenting with dyslipidemia are recommended for investigation to explore thyroid dysfunction.

Lipid profile measured following methods

- Serum total cholesterol: was measured by Enzymatic method Normal serum cholesterol: 150-250 mg/dl
- Serum HDL cholesterol: was measured by “Phosphotungstate method. Normal HDL – Cholesterol: 30 – 70 mg/dl.
- Serum LDL cholesterol: If the value of Triglycerides is known, LDL-cholesterol can be calculated based on Friedewald’s equation.
Serum Triglycerides was measured by enzymatic colorimetric method. Normal Serum Triglycerides:
Male: 60-165 mg/dl Female: 40-140 mg/dl.

RESULTS

Table 1: Socio-demographic profile

<table>
<thead>
<tr>
<th>Variable</th>
<th>No of cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>28</td>
<td>28.00%</td>
</tr>
<tr>
<td>Female</td>
<td>72</td>
<td>72.00%</td>
</tr>
<tr>
<td>Mean age</td>
<td>25.62±12.25 Yrs</td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>68</td>
<td>68.00%</td>
</tr>
<tr>
<td>Rural</td>
<td>32</td>
<td>32.00%</td>
</tr>
<tr>
<td>Hindu</td>
<td>86</td>
<td>86.00%</td>
</tr>
<tr>
<td>Muslim</td>
<td>14</td>
<td>14.00%</td>
</tr>
</tbody>
</table>

In present study most of patients were hindu female and mean age of patients was 25.62±12.25 Yrs.

Table 2: Comparison of biochemical parameters in case and controls.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Subclinical Hypothyroid</th>
<th>Overt Hypothyroid</th>
<th>Subclinical Hypothyroid</th>
<th>Overt Hypothyroid</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC</td>
<td>256.14±68.20</td>
<td>275.52±71.24</td>
<td>178.12±58.21</td>
<td>142.12±10.22</td>
<td>132.13±9.54</td>
</tr>
<tr>
<td>LDL</td>
<td>96.9±13.12</td>
<td>117.82±34.21</td>
<td>87.56±17.52</td>
<td>76.32±16.23</td>
<td>76.23±20.18</td>
</tr>
<tr>
<td>HDL</td>
<td>43.56±11.20</td>
<td>32.98±7.12</td>
<td>36.24±16.12</td>
<td>36.24±16.12</td>
<td>52.68±12.05</td>
</tr>
<tr>
<td>TG</td>
<td>206.6±44.23</td>
<td>234.5±37.2</td>
<td>116.2±24.2</td>
<td>58.6±44.02</td>
<td>79.6±49.06</td>
</tr>
</tbody>
</table>

The serum TC, TG and LDL levels in hypothyroid individuals (both overt and subclinical) were significantly higher than euthyroid subjects but the levels were comparable between hyperthyroid and euthyroid group.

Discussion

Thyroid dysfunction, along with a higher prevalence of goiter, is a major public health problem in India population. In this study, the prevalence of hypothyroidism was higher than hyperthyroidism similar finding observed by findings by Baral et al. and Holowell et al. The serum TC and LDL levels in hypothyroid individuals (both overt and subclinical) were significantly higher than euthyroid subjects but the levels were comparable between hyperthyroid and euthyroid group in our study.

Jung found mean plasma total cholesterol and LDL cholesterol levels elevated in hypothyroid cases than in normal controls.

In another study, average serum total cholesterol level was found elevated in primary and secondary hypothyroidism.

Keyes & Heimberg, Laker & Mayes found triglyceride level elevated in hypothyroid patients. Thompson and Abrams & Grundy have stated decreased activity of LDL receptors as the main cause of hypercholesterolemia in hypothyroidism.

Conclusion

Dyslipidemias are associated with thyroid disorders, so biochemical screening for thyroid dysfunction in all dyslipidemic patients. Therefore, patients presenting with dyslipidemia are recommended for investigation to explore thyroid dysfunction.

References