Lipid Profile in Subclinical and Overt Hypothyroidism

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Abstract: The effect of hypothyroidism on lipid metabolism is notable. Both synthesis and degradation of lipids are depressed, the latter especially so, the net effect being one of lipid accumulation. The decrease in lipid degradation may reflect a decrease in postheparin lipolytic activity as well as decrease delivery of lipid to degrading site. Although an increase in serum cholesterol is the most common abnormality of hypothyroidism, serum phospholipid and serum triglycerides are also increased and reverse happens with high density lipoprotein. Plasma free fatty acid is decreased and metabolism of free fatty acid is also impaired. These changes occur only in primary hypothyroidism, not in pituitary hypothyroidism.

I. Introduction

The following study is about the abnormalities of Lipid metabolism in subclinical and overt hypothyroidism patients. The study and study group and control group were taken in Coimbatore Medical College & Hospital with inclusion and exclusion criteria.

Aim Of The Study
To Find Out
1. Prevalence of dyslipidemia in hypothyroidism
2. Lipid profile in overt hypothyroidism
3. Lipid profile in subclinical hypothyroidism.
4. Total cholesterol-HDL ratio and LDL-HDL ratio in both overt and subclinical hypothyroidism

Subjects
Case Selection
Patients for this were selected from medical out patient & in patient department of Coimbatore Medical College and Hospital, Coimbatore. 20 patients with TSH levels more than 20µIU/ml and decreased T4 levels, and another 20 patients with TSH levels between 6 µIU/ml and 15 µIU/ml, and T4 levels with in normal range were selected as two study groups. 10 age matched controls were selected from Medicine outpatient department, Coimbatore Medical College & Hospital, Coimbatore. Control and study groups were screened for markers of hyperlipidemia.

Exclusion: Patients with other risk factors for dyslipidemia like diabetes mellitus, alcohol intake, liver diseases, renal diseases, history of smoking or drug intake like β blockers, diuretics, steroids, contraceptive pills were excluded.

Patients with history of acute illness, recent myocardial infarction, recent cerebrovascular accident or recent history of stress were excluded from study. Patients on drugs like lithium, iodide, phenytoin, tolbutamide, steroids, amiodarone and antithyroid drugs were excluded from study.

All the patients in study group were newly detected cases of hypothyroidism. All the newly detected patients were not given thyroxine replacement till the blood samples were being collected.

Methods: In the patients following investigations were done

DOI: 10.9790/0853-150806140143 www.iosrjournals.org
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1. Urine analysis for albumin, sugar and deposits
2. Blood for
   a) Complete hemogram
   b) Blood sugar – fasting and post prandial
   c) Blood urea
   d) Serum creatinine and electrolytes
   e) Serum TSH, T4, T3,
   f) Serum lipid profile including - Total cholesterol
      - Serum HDL
      - Serum TGL
3. ECG
4. X ray Chest – PA view

II. Data Analysis

Total Cholesterol
Hypercholesterolemia seen in 50% of patients with overt hypothyroidism and 40% of patients with subclinical hypothyroidism.
Mean total cholesterol in overt hypothyroidism 235.3 mg/dl.
Mean total cholesterol in subclinical hypothyroidism 202.9 mg/dl
Mean total cholesterol in control group hypothyroidism 166.7 mg/dl

LDL Cholesterol
30% of patients with overt hypothyroidism and 25% of patients with subclinical hypothyroidism had high LDL-C levels.
Mean LDL cholesterol in overt hypothyroidism 145.4 mg/dl
Mean LDL cholesterol in subclinical hypothyroidism 134.6 mg/dl
Mean LDL cholesterol in control group hypothyroidism 100.4 mg/dl

HDL Cholesterol
HDL-C less than 35 mg/dl seen in 30% of patients in both overt and subclinical hypothyroidism.
Mean HDL cholesterol in overt hypothyroidism 46.5 mg/dl
Mean HDL cholesterol in subclinical hypothyroidism 41.5 mg/dl
Mean HDL cholesterol in control group hypothyroidism 44.3 mg/dl
Mean HDL-C level is higher in overt hypothyroidism and lesser in subclinical hypothyroidism when compared with controls.

Total Cholesterol – HDL ratio
40% of patients with overt hypothyroidism and 35% of patients with subclinical hypothyroidism had TC/HDL > 5.
Mean TC/HDL cholesterol in overt hypothyroidism 5.1
Mean TC/HDL cholesterol in subclinical hypothyroidism 4.9
Mean TC/HDL cholesterol in control group hypothyroidism 3.7

Triglycerides
Hypertriglyceridemia seen in 25% of patients with overt hypothyroidism and 15% of patients with subclinical hypothyroidism.
Mean Triglyceride cholesterol in overt hypothyroidism 166.3 mg/dl
Mean Triglyceride cholesterol in subclinical hypothyroidism 134.9 mg/dl
Mean Triglyceride cholesterol in control group hypothyroidism 111 mg/dl
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Ldl-Hdl Ratio

40% of patients with overt hypothyroidism and 30% of patients with subclinical hypothyroidism had LDL/HDL >3.6. Mean LDL/HDL cholesterol in overt hypothyroidism 3.3
Mean LDL/HDL cholesterol in subclinical hypothyroidism 3.2
Mean LDL/HDL cholesterol in control group hypothyroidism 2.2

<table>
<thead>
<tr>
<th>Lipid profile</th>
<th>Control Sample size</th>
<th>Control X±SD</th>
<th>Overt Sample size</th>
<th>Overt X±SD</th>
<th>T-value</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total cholesterol</td>
<td>10 166.7±37.78</td>
<td>20 235.3±97.4</td>
<td>2.1295</td>
<td>P&lt;0.05 (S)</td>
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<td>TGL</td>
<td>10 111±52.05</td>
<td>20 166.3±70.7</td>
<td>2.1863</td>
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<td>LDL</td>
<td>10 100.4±35.21</td>
<td>20 145.4±61.08</td>
<td>2.14580</td>
<td>P&lt;0.05 (S)</td>
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<td>HDL</td>
<td>10 44.3±7.15</td>
<td>20 46.5±16.05</td>
<td>0.4106</td>
<td>N.S</td>
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<td>VLDL</td>
<td>10 22±10.42</td>
<td>20 33.2±14.21</td>
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<td>P&lt;0.05 (S)</td>
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<td>TC/HDL</td>
<td>10 3.752±0.487</td>
<td>20 5.115±1.87</td>
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<td>LDL/HDL</td>
<td>10 2.739±5.45</td>
<td>20 3.34±1.75</td>
<td>1.9275</td>
<td>P&lt;0.05 (S)</td>
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Mean Values Of Subfractions Of Lipid Profile In Subclinical Hypothyroidism

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<th>Lipid profile</th>
<th>Control Sample size</th>
<th>Control X±SD</th>
<th>Overt Sample size</th>
<th>Overt X±SD</th>
<th>T-value</th>
<th>P-value</th>
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<tr>
<td>Total cholesterol</td>
<td>10 166.7±37.78</td>
<td>20 202.85±63.17</td>
<td>1.568</td>
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<td>TGL</td>
<td>10 111±52.05</td>
<td>20 134.85±91.34</td>
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<td>LDL</td>
<td>10 100.4±35.21</td>
<td>20 134.6±54.74</td>
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<td>HDL</td>
<td>10 44.3±7.15</td>
<td>20 41.45±10.06</td>
<td>0.7971</td>
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<td>VLDL</td>
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<td>20 26.9±22.2</td>
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<td>TC/HDL</td>
<td>10 3.752±0.487</td>
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<td>LDL/HDL</td>
<td>10 2.739±5.45</td>
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<td>2.8269</td>
<td>P&lt;0.05 (S)</td>
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### III. Conclusion

1. The prevalence of hypercholesterolemia in hypothyroidism is between 45% to 60%.
2. Total cholesterol, LDL cholesterol and triglycerides are elevated in both overt and subclinical hypothyroidism.
3. HDL cholesterol showed variable responses.
4. Total cholesterol-HDL ratio and LDL-HDL ratio are higher in both overt and subclinical hypothyroidism.
5. Both overt and subclinical hypothyroidism predispose to early atherosclerosis.
6. In all cases of dyslipidemia, this easily treatable cause should be evaluated even though the subject is clinically normal.

### Bibliography


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