Subclinical Hypothyroidism Is Associated With Coronary Artery Disease in Older Persons

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\textbf{Background.} We report the prevalence of coronary artery disease (CAD) associated with subclinical hypothyroidism in older persons.

\textbf{Methods.} We investigated the prevalence of subclinical hypothyroidism and its association with dyslipidemia and with CAD in 170 women and 110 men, mean age 75 ± 9 years, in an academic nursing home.

\textbf{Results.} Of 280 persons, 18 (6\%) had subclinical hypothyroidism, 18 (6\%) had treated clinical hypothyroidism, 13 (5\%) had subclinical hyperthyroidism, and 231 (83\%) were euthyroid. Dyslipidemia occurred in 15 of 18 persons (83\%) with subclinical hypothyroidism, in nine of 18 persons (50\%) treated for hypothyroidism, in six of 13 persons (46\%) with subclinical hyperthyroidism, and in 128 of 231 euthyroid persons (55\%) \(p < .025\) comparing subclinical hypothyroidism with treated hypothyroidism and with subclinical hyperthyroidism). CAD was present in 10 of 18 persons (56\%) with subclinical hypothyroidism, in nine of 18 persons (50\%) with treated hypothyroidism, in 5 of 13 persons (38\%) with subclinical hyperthyroidism, and in 38 of 231 euthyroid persons (16\%) \(p < .001\) comparing subclinical hypothyroidism with euthyroidism; \(p < .005\) comparing subclinical hypothyroidism and euthyroidism). Median 

\textbf{Conclusions.} Subclinical hypothyroidism was associated with a high prevalence of dyslipidemia and a high prevalence of CAD.

HYPOTHYROIDISM causes an increase in serum low-density lipoprotein (LDL) cholesterol and an increased incidence of coronary artery disease (CAD) (1,2). Subclinical hypothyroidism was present in 11\% of 1149 women, mean age 69 ± 8 years, participating in the Rotterdam Study and was associated with a 2.3 time (1.3–4.2) increase in myocardial infarction in these women (3). Two other studies demonstrated an association between subclinical hypothyroidism and CAD in older women (4,5), and one Finnish study found no association between subclinical hypothyroidism and CAD in men and women (6).

We performed a study investigating the prevalence of subclinical hypothyroidism and its association with dyslipidemia and with documented CAD in all persons in a university-affiliated nursing home. This article reports the data observed in our study.

\textbf{METHODS}

Thyroid function tests, serum lipids, and a 12-lead electrocardiogram were obtained in all persons currently residing in a nursing home affiliated with Westchester Medical Center/New York Medical College according to a protocol designed by Wilbert S. Aronow. The study population included 170 women and 110 men, mean age 75 ± 9 years. Dyslipidemia was diagnosed if the serum total cholesterol was ≥200 mg/dl, if the serum LDL cholesterol was >130 mg/dl, if the serum high-density lipoprotein (HDL) cholesterol was <40 mg/dl, or if the serum triglycerides was ≥190 mg/dl.

Euthyroidism was diagnosed if the thyroid stimulating hormone (TSH) level was between 0.4–4.7 \(\mu\text{U} / \text{ml}\) and the thyroxine (T\textsubscript{4}) level was between 4.5–12.0 \(\mu\text{g} / \text{dl}\). Eighteen patients were receiving l-thyroxine for previously documented clinical hypothyroidism. Subclinical hypothyroidism was diagnosed if the serum TSH level was elevated and the serum T\textsubscript{4} level was in the normal range. Subclinical hyperthyroidism was diagnosed if the serum TSH level was <0.4 \(\mu\text{U} / \text{ml}\) and the serum T\textsubscript{4} level was in the normal range.

CAD was documented if the person had prior coronary revascularization, coronary angiographic evidence of significant CAD, a documented history of myocardial infarction, electrocardiographic evidence of Q-wave myocardial infarction, or typical angina pectoris with evidence of myocardial ischemia. We reviewed all electrocardiograms for evidence of myocardial infarction. Chi-square analyses were used to analyze data.

\textbf{RESULTS}

Of 280 persons, 170 persons (61\%) were women, and 110 persons (39\%) were men. Of 280 persons, 18 persons (6\%) were being treated with l-thyroxine for previously documented clinical hypothyroidism, 18 persons (6\%) had subclinical hypothyroidism, 13 persons (5\%) had subclinical hyperthyroidism, and 231 persons (83\%) were euthyroid. Euthyroidism was present in 135 of 170 women (79\%) and in 96 of 110 men (87\%) \(p\) not significant. Clinically treated hypothyroidism was present in 13 of 170 women...
Coronary artery disease was present in 16 of 170 women (9%) and in two of 110 men (2%) (p < .02). Subclinical hyperthyroidism was present in six of 170 women (4%) and in seven of 110 men (6%) (p not significant).

Table 1 shows the prevalence of dyslipidemia and of CAD in persons with euthyroidism, treated clinical hypothyroidism, subclinical hypothyroidism, and subclinical hyperthyroidism and also lists levels of statistical significance. Electrocardiographic evidence of Q-wave myocardial infarction was present in eight of 16 women (50%) with subclinical hypothyroidism and in two of two men (100%) with subclinical hypothyroidism (p not significant).

Of the 158 persons with dyslipidemia, only one person (1%) had hypertriglyceridemia without other associated lipid abnormalities. The type of dyslipidemia associated with subclinical hypothyroidism was an increased serum LDL cholesterol, a decreased serum HDL cholesterol, or both an increased serum LDL cholesterol and a decreased serum HDL cholesterol.

**DISCUSSION**

Subclinical hypothyroidism was found in 11% of 1149 women, mean age 69 years, participating in the Rotterdam Study (3) and in 9% of 170 women, mean age 75 years, in the present study (p not significant). Serum LDL cholesterol levels were not obtained in the Rotterdam Study (3). In the present study, dyslipidemia characterized by increased serum LDL cholesterol or decreased serum HDL cholesterol was present in 15 of 18 persons (83%) with subclinical hypothyroidism.

An association between CAD and subclinical hypothyroidism has been reported in elderly women in the Rotterdam Study (3) and in two other studies (4,5). A Finnish study reported no evidence that subclinical hypothyroidism was associated with CAD in men and women (6). In the present study, CAD was associated with subclinical hypothyroidism in elderly women and in elderly men. Although only two men in the present study had subclinical hypothyroidism, both men had electrocardiographic evidence of Q-wave myocardial infarction with evolution of Q waves on serial electrocardiograms. Further investigation needs to be performed on the association of subclinical hypothyroidism with CAD in elderly men.

On the basis of the dyslipidemia and CAD associated with subclinical hypothyroidism observed in the present study, older persons with subclinical hypothyroidism should be treated with l-thyroxine. The persons with subclinical hypothyroidism in the present study are now receiving l-thyroxine.

**Table 1. Prevalence of Dyslipidemia and of Coronary Artery Disease in Persons With Euthyroidism, Treated Hypothyroidism, Subclinical Hypothyroidism, and Subclinical Hyperthyroidism**

<table>
<thead>
<tr>
<th>Disease</th>
<th>Euthyroidism (n = 231)</th>
<th>Treated Hypothyroidism (n = 18)</th>
<th>Subclinical Hypothyroidism (n = 18)</th>
<th>Subclinical Hyperthyroidism (n = 13)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dyslipidemia*</td>
<td>128 (55%)</td>
<td>9 (50%)</td>
<td>15 (83%)</td>
<td>6 (46%)</td>
</tr>
<tr>
<td>Coronary artery</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>disease**</td>
<td>38 (16%)</td>
<td>8 (44%)</td>
<td>10 (56%)</td>
<td>5 (38%)</td>
</tr>
</tbody>
</table>

*For dyslipidemia, p < .025 comparing subclinical hypothyroidism with euthyroidism; p < .005 comparing subclinical hypothyroidism with treated hypothyroidism and with subclinical hyperthyroidism.

**For coronary artery disease, p < .001 comparing subclinical hypothyroidism with euthyroidism; p < .005 comparing subclinical hypothyroidism with treated hypothyroidism and with subclinical hyperthyroidism; and p < .05 comparing subclinical hyperthyroidism with euthyroidism.

**ACKNOWLEDGMENT**

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Received April 9, 2002
Accepted April 15, 2002.

**SUBCLINICAL HYPOTHYROIDISM AND CORONARY ARTERY DISEASE**