**Topic:** ELEVATED SERUM TSH IN OBESE CHILDREN

**Title:** Prevalence of thyroid dysfunction in obese children and adolescents before and after weight reduction and its relation to other metabolic parameters.

**Authors:** Shalitin S, Yackobovitch-Gavan M, & Phillip M (Tel-Aviv, Israel)

**Reference:** Hormone Research 71: 155-161, 2009

---

**Aim:** To establish the prevalence of elevated serum TSH levels in obese children & adolescents, and identify the relationship between changes in TSH levels and other metabolic and hormonal variables before and after weight reduction.

**Methods:** Two hundred and seven obese children and adolescents, aged 5-18 years, were evaluated before and after a weight reduction for anthropometric, biochemical, metabolic and hormonal variables.

**Results:** At baseline, 46 participants (22.2%) had elevated TSH (≥ 4.0 µU/ml). Free T4 levels were normal in all cases. Triglyceride levels were significantly higher in participants with hyperthyrotropinemia than in those with normal thyroid function (P=0.011). Baseline TSH was significantly correlated with triglyceride levels (r=0.261; P <0.001), but not with age, anthropometric, or laboratory variables. Among 142 participants who completed weight-related intervention, 27 (19%) participants had hyperthyrotropinemia. There was no significant relationship between changes in TSH level and changes in body mass index-standard deviation score. A significant correlation was found between the final TSH level and triglyceride level (r=0.167; P=0.045), and between the decrease in TSH level and the decrease in waist circumference (r = 0.291; P=0.013).

**Conclusions:** In obese children & adolescents, elevated TSH with normal free T4 levels appears to be frequent. The correlation of hyperthyrotropinemia with waist circumference and higher triglyceride levels raises the question of the necessity to treat the elevated TSH levels.

---

**COMMENT**

Obesity among children and adolescents is steadily on the increase, a reflection of the worldwide epidemic of obesity in developed countries. The present study was retrospective and included 110 girls and 97 boys with a BMI above the 95th percentile (for age & gender) who were involved in a 12-week weight reduction programme.

At baseline, a serum TSH ≥4.0 µU/ml was found in 30 girls and 16 boys (i.e. 22.2% of the cohort): mean TSH value of 5.08-5.20 µU/ml. Serum free T4 and total T3 levels were normal, and they did not differ between those children with or without TSH elevation. Clinically, there was no palpable goiter. Seventy percent of the children/adolescents were pre-pubertal; the prevalence of elevated TSH did not differ between pre-pubertal and pubertal subjects. The only other significant difference, among all anthropometric and laboratory characteristics evaluated in the study, was for triglycerides levels which, on the average, were 1.25-fold and 1.17-fold higher, respectively in boys and girls with elevated serum TSH (P=0.03).

A total of 141 subjects completed the weight reduction programme, with an overall success rate of 89%. Weight
reduction was accompanied by significant decreases in BMI (-2.16), body fat percentage (-4.3%), waist circumference (-7 cm), total cholesterol (-12 mg/dl), leptin (-9.7 ng/ml), and adiponectin levels (-265 ng/ml). Overall, serum TSH levels did not change. Serum triglycerides decreased by a mean of 19 mg/dl, both in the subjects who and did not lose weight (no difference). At the end of the intervention period, TSH levels were elevated in 27 subjects, including 13 children/adolescents (8 girls and 5 boys) in whom TSH levels had remained elevated from baseline data and another 14 children/adolescents (7 girls and 7 boys) in whom TSH increased during the intervention.

The authors concluded that the presence of elevated TSH levels, concomitant with normal thyroid function tests and absence of thyroid auto-antibodies (such rare cases were excluded from the study), seems to be a frequent condition in young subjects in Israel. The correlation of elevated serum TSH with waist circumference and higher triglyceride levels raises the question of whether to treat isolated mildly elevated TSH levels in obese children, implying that the TSH abnormality may reflect subclinical hypothyroidism. However, nothing really proves that subtle thyroid dysfunction was present in these subjects. Among alternative possibilities is that of a possible mild TSH resistance (be it functionally related to obesity or genetically-related) which could explain the need to maintain slightly higher TSH values to ensure a normal thyroid function. Another hypothesis, perhaps more appealing to the subjective opinion of this commentator, would be that obesity in the young may be accompanied by some resetting of the hypothalamic-pituitary axis, by unknown mechanisms yet to be explored.

(Daniel Glinoer, M.D.; Ph.D.)

See Table below

<table>
<thead>
<tr>
<th>Change in BMI-SDS during the intervention</th>
<th>TSH values</th>
<th>&lt;4 mIU/l at baseline and end-intervention</th>
<th>≥4 mIU/l at baseline/ &lt;4 mIU/l at end-intervention</th>
<th>≥4 mIU/l at baseline and at end-intervention</th>
<th>&lt;4 mIU/l at baseline/ ≥4 mIU/l at end-intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decrease in BMI-SDS &gt;0.5</td>
<td>69 (71.9%)</td>
<td>8 (8.3%)</td>
<td>11 (11.5%)</td>
<td>8 (8.3%)</td>
<td></td>
</tr>
<tr>
<td>Decrease in BMI-SDS 0–0.5</td>
<td>19 (79.2%)</td>
<td>0</td>
<td>1 (4.2%)</td>
<td>4 (16.7%)</td>
<td></td>
</tr>
<tr>
<td>Increase in BMI-SDS</td>
<td>10 (71.4%)</td>
<td>1 (7.1%)</td>
<td>1 (7.1%)</td>
<td>2 (14.3%)</td>
<td></td>
</tr>
</tbody>
</table>