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Thyroid function in obese children and its correlations with chosen atherogenic risk factors

INTRODUCTION

Moderately elevated thyroid- stimulating hormone (TSH) with normal serum concentrations of free thyroxine (fT4), suggesting subclinical hypothyroidism, is the most common hormonal abnormality in obese children.
Controversy remains whether thyroid dysfunction related to obesity has an influence on the cardiovascular risk factors.

THE AIMS The aim of the study was to assess correlation between TSH and fT4 and chosen atherogenic risk factors in obese children and adolescent.

MATERIAL AND METHODS

STUDY GROUP - 110 obese children (48 girls, 62 boys), aged 5.25-17.91 years (11.54 ± 2.9 yrs)
Obesity was defined using IOTF criteria. Mean BMI was 29.5 ± 4.9 kg/m2, SDS BMI 2.78 ± 0.49
CONTROL GROUP - 38 healthy children (13.4 ± 2.63 yrs). Mean BMI 18.7 ± 2.7 kg/m2

ANTHROPOMETRIC MEASUREMENTS: body weight (kg), standing height (cm) ⟶ BMI, BMI SDS (LMS method)
LABORATORY TESTS: TSH, fT4, adiponectin, lipids profile ⟶ TC/HDL-C, TG/HDL-C, LDL-C/HDL-C
CAROTID ULTRASONOGRAPHY: intima – media thickness (IMT)
STATISTICAL ANALYSIS (SPSS 19 software): Spearman correlation analysis, T test or Mann-Whitney test, multiple linear regression analysis

RESULTS

1. Obese children had higher mean serum TSH levels compared to their lean peers (2.14 ± 0.97 µIU/ml vs. 1.47 ± 0.63 µIU/ml, p = 0.000) and an adverse atherogenic lipids profile (**Table 1**).
2. Serum TSH values correlated with TC/ HDL-C (r = 0.286, p = 0.000),
   TG/ HDL-C (r = 0.236, p = 0.004),
   LDL-C/ HDL-C (r = 0.281, p = 0.001),
   IMT (r = 0.290, p = 0.003),
   but not with adiponectin (p = 0.7).
3. In multivariate regression analysis TSH weakly correlated only with IMT after adjustment for age, gender and BMI SDS.
   This relationship weakened after considering lipid profile (**Table 2**).
4. Serum fT4 concentrations were comparable between groups.
   No relationship was found for fT4.

Variable	Obese group (n=110)	Control group (n=38)
TSH (µIU/ml)	2.14 ± 0.97	1.47 ± 0.63***
fT4 (ng/dl)	0.99 ± 0.17	1.00 ± 0.11
TC (mg/dl)	177.47 ± 29.52	156.77 ± 23.85***
HDL -C (mg/dl)	44.03 ± 10.79	55.86 ± 12.53***
LDL-C (mg/dl)	106.31 ± 27.19	84.26 ± 25.64***
TG (mg/dl)	135.32 ± 63.38	77.09 ± 35.87***
TC/HDL-C	4.25 ± 1.25	2.95 ± 0.83***
TG/HDL-C	3.41± 2.16	1.51 ± 0.95***
LDL-C/HDL-C	2.57 ± 0.97	1.63 ± 0.71***
Adiponectin (µg/ml)	13.26 ± 5.94	15.24 ± 5.65
IMT (mm)	0.55 ± 0.15	0.53 ± 0.14

Table 1.
Data are: mean ± SD, TC = total cholesterol, TG = triglycerides, HDL-C = HDL cholesterol, LDL-C = LDL cholesterol,
*** P < 0,001

Independent variables		β	SE	P-value
Model 1	**Age**	0.008	0.007	0.256
	Gender	- 0.052	0.036	0.153
	BMI SDS	0.047	0.041	0.259
	TSH	0.041	0.020	**0.041**
Model 2	**Age**	0.008	0.007	0.282
	Gender	-0.052	0.038	0.170
	BMI SDS	0.049	0.043	0.255
	TC	0.000	0.002	0.844
	LDL-C	0.000	0.002	0.839
	TG	0.000	0.000	0.879
	TSH	0.040	0.021	**0.058**

Table 2.
IMT dependent variable,
B = non-standardized coefficient,
SE = standard error

CONCLUSIONS

Elevated level of TSH in obese children did not seem to impact atherogenic lipid indicators and carotid IMT.
Therefore, adverse lipid profile should still be considered the main risk factor for development of cardiovascular disease in obese children.

The authors declare no conflicts of interest

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