

RELATION BETWEEN THYROID FUNCTION TESTS AND CARDIOMETABOLIC RISK FACTORS IN CHILDHOOD OBESITY

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BACKGROUND

It is known that obese children are at higher risk in terms of cardiovascular diseases when compared with children with normal weight. Recent studies emphasize on the fact that there is a relation between TSH and several cardiovascular risk factors in obese children.

OBJECTIVES

The aim of the current study is to investigate the relation between conventional and recently defined cardiometabolic risk factors and thyroid function tests in obese children.

METHOD

148 obese children with a body mass index (BMI) >95 percentile, 128 overweight children with a BMI between 85 and 95 percentile and 142 children with a BMI <85 percentile were evaluated in terms of thyroid function tests and cardiometabolic risk factors. The mean age of patients was 11.2 ± 2.3 years (age range was 7-18). BMI, waist circumference, systolic and diastolic blood pressures, serum lipid levels, fasting blood glucose and fasting insulin levels, CRP, homocystine, lipoprotein A, fibrinogen levels were evaluated as cardiometabolic risk factors. OGTT was done to all cases in order to evaluate glucose metabolism disorders and HOMA-IR value was calculated.

RESULTS

Clinical and laboratory characteristics of the cases involved in the study are given in table 1. When compared with normal weight children, TSH levels were higher, fT4 levels were lower and fT3 levels were higher in obese children. When the obese patients were divided into three groups according to the severity of obesity as slight-moderate-severe, fT4 levels were lowest and TSH levels were highest in the severely obese group when compared with the other two groups. A significant positive correlation was found between TSH levels and BMI-SDS, HOMA-IR, serum triglyceride, serum total cholesterol, LDL, homocystine, lipoprotein a levels. The factors which may affect TSH levels were evaluated with multiple regression analysis. It was demonstrated that BMI-SDS, waist circumference, systolic blood pressure, serum triglyceride, LDL, HOMA-IR levels are correlated with TSH (Table 2).

RESULTS

When corrected according to age, gender, puberty stage and BMI-SDS, it was found that TSH was correlated with impaired glucose tolerance, impaired fasting glucose and insulin resistance (respectively OR: 1.44, 95%CI:1.06-1.98, p<0.05; OR: 1.30, 95%CI:1.10-1.52, p<0.01; OR:1.25, 95%CI: 1.05-1.48, p<0.05).

Table 1. Clinical and laboratory characteristics of the cases

	Obese BMI≥95 p) (n=148)	Over weight (BMI 85-95p) (n=128)	Normal weight (BMI<85 p) (n=142)	P value
Age (years)	11.1±2.4	11.3±2.3	11.1±2.3	0.420
Boys/Girls, n (%)	70 (47.3)/78 (52.7)	62 (48.4)/66(51.6)	68(47.9)/74(52.1)	0.401
Prepubertal/pubertal, n(%)	56(37.8)/92(62.2)	50(39.1)/78(60.9)	57(40.1)/85(59.9)	0.396
BMI (kg/m ²)	28.1±2.3	21.7±2.1	17.4±2.1	<0.001
BMI-SDS	2.1±0.3	1.3±0.1	-0.1±0.8	<0.001
Waist Circumference (cm)	91.4±11.2	72.1±8.5	61.5±7.1	<0.001
Hip Circumference (cm)	99.2±13.1	90.1±7.9	83.5±8.2	<0.001
Waist/Hip ratio	0.9±0.2	0.8±0.2	0.7±0.3	0.058
Systolic BP (mmHg)	115.6±13.1	108.8±11.4	103.2±11.2	<0.001
Diastolic BP (mmHg)	74.8±9.8	69.8±9.1	64.6±8.4	<0.001
TSH, mIU/L	3.2±1.4	2.8±1.3	2.1±1.1	<0.001
fT4 (ng/dl)	0.9±0.2	1.0±0.2	1.2±0.2	<0.001
fT3 (pg/ml)	3.9±0.5	3.6±0.5	2.9±0.5	<0.001
LDL (mg/dl)	106.2± 22.6	98.2± 19.5	77.2± 20.5	<0.001
HDL (mg/dl)	45.1± 9.8	47.2± 10.8	49.4± 11.6	0.004
TG (mg/dl)	112.2± 55.6	96.8± 54.9	78.8± 44.6	<0.001
Fasting glucose (mg/dl)	88.6± 7.1	86.2± 8.8	78.6± 8.4	<0.001
2.hour glucose (mg/dl)	118.2±11.2	106.6±10.8	90.8±9.6	<0.001
Fasting insulin (IU/L)	16.1 ±8.8	12.1±6.7	8.1±4.6	<0.001
HOMA-IR	3.7±2.1	2.7± 1.7	1.7±1.0	<0.001
CRP (mg/dl)	0.3± 0.5	0.2± 0.5	0.1± 0.4	<0.001
Homocysteine (mg/dl)	13.9± 5.5	12.2± 7.4	9.4± 3.1	<0.001
Lipoprotein A (mg/dl)	45.4± 26.8	30.8± 22.8	22.0± 17.2	<0.001
Fibrinogen (mg/dl)	329.8±146.0	288.6±80.1	266.8±60.2	<0.001

Table 2. Factors affecting TSH levels

	β	P Value
BMI-SDS	0.176	0.021
Waist Circumference	0.164	0.036
Systolic Blood Pressure	0.114	0.049
Diastolic Blood Pressure	0.062	0.408
LDL	0.122	0.042
HDL	0.068	0.420
TG	0.116	0.048
Fasting glucose	0.021	0.608
HOMA-IR	0.144	0.038

CONCLUSION

The thyroid function dysfunction and increased TSH levels in obese children could be related to dyslipidemia, insulin resistance, impaired glucose metabolism and other increased cardiometabolic risk factors.

