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Association between thyroid hormones and cardiometabolic risk factors in euthyroid overweight and obese children and adolescents following the implementation of a lifestyle intervention program

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Background: Thyroid hormones regulate metabolism and play a significant role in cardiovascular homeostasis. However, the association between thyrotropin (TSH), thyroid hormones and cardiometabolic risk factors has not been elucidated in euthyroid children and adolescents with overweight and obesity.

Aim: To evaluate the relation of TSH and thyroid hormones with cardiometabolic parameters in euthyroid obese, overweight and normal-weight children and adolescents before and after the implementation of a comprehensive, multidisciplinary, personalized lifestyle intervention program for 1 year.

Methodology: One thousand and four hundred twenty-eight ($n = 1.428$) children and adolescents aged 2–18 years (mean age \pm SD: 9.923 ± 3.018 years; 742 females, 686 males) with normal thyroid

function were studied prospectively. Subjects were classified as obese ($n = 766$, 53.6%), overweight ($n = 408$, 28.6%) or with normal body mass index (BMI) ($n = 254$, 17.8%) according to the International Obesity Task Force cutoff points. All participants were evaluated by a multidisciplinary team at frequent intervals, received personalized guidance on diet and physical exercise and were studied prospectively for 1 year. Detailed clinical evaluation and laboratory investigations were performed at the beginning and at the end of the study.

Results: Subjects with obesity had significantly higher systolic (SBP) and diastolic (DBP) blood pressure, waist circumference, hip circumference and waist-to-hip ratio than overweight and normal-BMI subjects on both assessments. In addition, they had significantly higher concentrations of fasting plasma glucose and serum insulin, HbA1C, triglycerides, LDL-cholesterol, uric acid and ApoB, and significantly lower concentrations of HDL-cholesterol, ApoA1 and Vitamin D than their overweight and normal-BMI counterparts. Baseline total T3 concentrations were positively associated with uric acid and negatively associated with HDL and creatinin, while Free T4 concentrations were inversely associated with baseline glucose and insulin concentrations. No associations were found between baseline TSH concentrations and cardiometabolic risk parameters. Following the 1-year of multidisciplinary management interventions, all cardiometabolic indices improved significantly in all subjects. In overweight and obese children changes in Free T4 concentrations were significantly associated with changes in cholesterol, LDL, glucose and creatinine concentrations. T3 changes were significantly associated with changes in uric acid, glucose, creatinine and WHratio. Finally, TSH was significantly associated with changes in cholesterol concentrations.

Conclusions: In euthyroid overweight and obese children and adolescents thyroid hormones are associated with indices conferring cardiometabolic risk. Changes in Free T4, T3 and TSH concentrations are also associated with changes in various cardiometabolic parameters, such as cholesterol, glucose and creatinine.

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