



ORIGINAL ARTICLE

Serum TSH levels are associated with cardiovascular risk factors in overweight and obese adolescents[☆]



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KEYWORDS

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hypothyroidism;
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Overweight;
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Abstract

Objective: To investigate the relationship between serum thyrotropin (TSH), insulin resistance (IR), and cardiovascular risk factors (CRF) in a sample of overweight and obese Brazilian adolescents.

Methods: A retrospective, longitudinal analysis of 199 overweight and obese pubescent adolescents was performed. The TSH and free T4 (fT4) levels, anthropometric measurements, and laboratory test results of these patients were analyzed.

Results: 27 individuals (13.56%) presented with TSH levels above the normal level (subclinical hypothyroidism [SCH]). Their waist circumference (WC) was significantly higher than those of euthyroid individuals. Serum TSH was positively correlated with the homeostasis model assessment of insulin resistance (HOMA-IR) index, triglycerides (TG) and high-density lipoprotein cholesterol (HDL-C). Using TSH and BMI as independent variables, TSH levels were shown to be independently related to HOMA-IR ($p=0.001$) and TG ($p=0.007$). Among euthyroid subjects, individuals with TSH values <2.5 mIU/mL exhibited statistically significant decreases in waist-to-hip ratio, HDL-C levels, and HOMA-IR scores and a tendency toward lower WC values.

Conclusion: SCH in overweight and obese adolescents appears to be associated with excess weight, especially visceral weight. In euthyroid adolescents, there appears to be a direct relationship between TSH and some CRF. In conclusion, in the present sample of overweight and obese adolescents, TSH levels appear to be associated with IR and CRF.

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PALAVRAS-CHAVE

Hipotireoidismo subclínico;
Adolescentes;
Obesidade;
Sobrepeso;
Fatores de risco cardiovascular

Níveis de TSH sérica associados a fatores de risco cardiovascular em adolescentes acima do peso e obesos

Resumo

Objetivo: Investigar a relação entre tireotrofina sérica (TSH), resistência à insulina (RI) e fatores de risco cardiovascular (FRC) em uma amostra de adolescentes brasileiros acima do peso e obesos.

Métodos: Foi realizada uma análise longitudinal retrospectiva de 190 adolescentes púberes acima do peso e obesos. Foram analisados os níveis de TSH e T4 livre (T4L), as medidas antropométricas e os resultados de exames laboratoriais desses pacientes.

Resultados: 27 indivíduos (13,56%) apresentaram níveis de TSH acima do normal (hipotireoidismo subclínico (HSC)). Eles apresentaram circunferência da cintura (CC) significativamente maior que os indivíduos eutireoideos. A TSH sérica foi positivamente correlacionada ao índice do modelo de avaliação da homeostase de resistência à insulina (*HOMA-IR*), triglicerídeos (TG) e lipoproteína de alta densidade-colesterol (HDL-C). Usando TSH e IMC como variáveis independentes, os níveis de TSH estavam relacionados ao *HOMA-IR* ($p=0.001$) e a TG ($p=0.007$) de forma independente. Entre os pacientes eutireoideos, indivíduos com valores de TSH <2.5 mIU/mL apresentaram reduções estatisticamente significativas na razão cintura/quadril, nos níveis de HDL-C e nos escores de *HOMA-IR* e tendência a menores valores de CC.

Conclusão: O HSC em adolescentes acima do peso e obesos parece estar associado ao excesso de peso, principalmente de peso visceral. Em adolescentes eutireoideos, parece haver uma relação direta entre TSH e alguns FRC. Concluindo, em nossa amostra de adolescentes acima do peso e obesos, os níveis de TSH parecem estar associados a RI e FRC.

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Introduction

The incidence of obesity in childhood and adolescence is increasing in developing and developed countries.¹ In Brazil, a developing country, data from the Household Budget Survey (Pesquisa de Orçamentos Familiares [POF]) showed that the percentage of overweight individuals between the ages of 10 and 19 increased from 3.7% (1974–1975) to 21.7% (2008–2009) in males and from 7.6% to 19.4% in females in the same periods.²

The well-established association between obesity and glucose/lipid metabolism disorders, hypertension and increased cardiovascular risk (CVR) is frequently referred to as metabolic syndrome (MetS).³ Individuals in the pediatric age group may also show increased MetS-related morbidity.^{3–5}

Thyroid hormones (TH) play a key role in regulating metabolism through the modulation of thermogenesis and energy expenditure. The putative relationships between TH, body weight, and adipose tissue homeostasis have been the focus of several studies in recent years, but the causal relationships between these parameters have not been well established.^{6–12} One review⁸ included several population-based studies that revealed a correlation between increased serum thyrotropin (TSH) levels and increased BMI.

Thyroid diseases have been associated with atherosclerotic cardiovascular disease.^{13–16} Although this association has been documented conclusively for overt hypothyroidism, it remains controversial whether it is also present in subclinical hypothyroidism (SCH).^{17,18} The association of

thyroid diseases with atherosclerotic cardiovascular disease may be partially explained by the roles of TH in the regulation of lipid metabolism and blood pressure (BP). Indeed, several recent population-based studies have observed positive correlations between TSH and lipid parameters and between TSH and BP, even in euthyroid populations.^{6–18} This study aimed to investigate the relationship between thyroid function, obesity, lipids, insulin resistance, and MetS components in a sample of overweight adolescents. The study also aimed to assess the metabolic and anthropometric differences of euthyroid patients with TSH in the upper limit of normality (≥ 2.5 μ IU/mL) in comparison to patients in the lower levels.

Patients and methods**Subjects**

This study evaluated a total of 199 overweight and obese pubescent adolescents of both genders between 11 and 17 years of age (from Tanner stage II or post-pubertal stage) who sequentially sought treatment for obesity at the Metabolic Outpatient Clinic of the Luiz Capriglione State Institute of Diabetes and Endocrinology (Instituto Estadual de Diabetes e Endocrinologia Luiz Capriglione [IEDE], Rio de Janeiro, Brazil), from March of 2011 to February of 2013. The protocol was approved by the Ethics Committee of the Institution and a written informed consent was obtained from the participants and their parents/guardians.

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