



ORIGINAL ARTICLE

Early changes in adipokines from overweight to obesity
in children and adolescents[☆]Rafael Machado Mantovani^a, Natália Pessoa Rocha^b, Daniel Massote Magalhães^b,
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KEYWORDS

Leptin;
Adiponectin;
Resistin;
Metabolic markers;
Soluble tumor
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receptor

Abstract

Objective: Childhood obesity has been associated with metabolic syndrome and cardiovascular diseases. This study aimed to compare plasma levels of traditional metabolic markers, adipokines and soluble tumor necrosis factor receptor type 1 (sTNFR1) in overweight, obese and lean children. We also assessed the relationships of these molecules with classical metabolic risk factors.

Methods: This study included 104 children and adolescents, which were grouped as: lean ($n=24$), overweight ($n=30$), and obese subjects ($n=50$). They were subjected to anthropometrical, clinical and laboratorial measurements. All measurements were compared between groups. Correlation analyses were also performed to evaluate the association between clinical data, traditional metabolic markers, adipokines and sTNFR1.

Results: Fasting glucose, insulin, homeostatic model assessment of insulin resistance (HOMA-IR), LDL-cholesterol and triglycerides were comparable in lean, overweight and obese subjects. Plasma levels of sTNFR1 were similar in lean and overweight subjects, but significantly increased in obese group. Leptin, adiponectin and resistin levels did not differ when overweight were compared to obese subjects. However, all adipokines differed significantly when lean subjects were compared to overweight and obese individuals. Plasma levels of adiponectin were negatively correlated with body mass index (BMI), whereas leptin, resistin and sTNFR1 concentrations positively correlated with BMI.

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PALAVRAS-CHAVE

Leptina;
Adiponectina;
Resistina;
Marcadores
metabólicos;
Receptor solúvel de
fator de necrose
tumoral

Conclusion: Our results showed significant differences in circulating levels of the evaluated markers when lean, overweight and obese individuals were compared, suggesting that these biomarkers may change from lean to overweight and from overweight to obesity.

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Alterações precoces nos níveis de adipocinas de sobrepeso para obesidade em crianças e adolescentes

Resumo

Objetivo: A obesidade na infância tem sido associada à síndrome metabólica e a doenças cardiovasculares. O objetivo deste estudo foi comparar níveis plasmáticos de marcadores metabólicos tradicionais, adipocinas e do receptor solúvel de fator de necrose tumoral tipo 1 (sTNFR1) em crianças com sobrepeso, obesas e magras. Também avaliamos as relações dessas moléculas com fatores de risco metabólico clássicos.

Métodos: Este estudo incluiu 104 crianças e adolescentes, agrupados da seguinte forma: indivíduos magros (n = 24), com sobrepeso (n = 30) e obesos (n = 50). Eles foram submetidos a medições antropométricas, clínicas e laboratoriais. Todas as medições foram comparadas entre os grupos. Também foram realizadas análises de correlação para avaliar a associação entre dados clínicos, marcadores metabólicos tradicionais, adipocinas e sTNFR1.

Resultados: Glicemia de jejum, insulina, modelo de avaliação da homeostase da resistência à insulina (HOMA-IR), colesterol LDL e triglicérides foram comparáveis em indivíduos magros, com sobrepeso e obesos. Os níveis plasmáticos de sTNFR1 foram similares em indivíduos magros e com sobrepeso, porém significativamente maiores no grupo obeso. Os níveis de leptina, adiponectina e resistina não diferiram quando indivíduos com sobrepeso foram comparados aos obesos. Contudo, todas as adipocinas diferiram significativamente quando indivíduos magros foram comparados a indivíduos com sobrepeso e obesos. Os níveis plasmáticos de adiponectina estavam negativamente correlacionados ao índice de massa corporal (IMC), ao passo que as concentrações de leptina, resistina e sTNFR1 estavam positivamente correlacionadas ao IMC.

Conclusão: Nossos resultados mostraram diferenças significativas nos níveis circulantes dos marcadores avaliados ao comparar indivíduos magros, com sobrepeso e obesos, sugerindo que esses biomarcadores poderão mudar de indivíduos magros para indivíduos com sobrepeso e de indivíduos com sobrepeso para obesos.

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Introduction

Childhood obesity is increasing in prevalence and is strongly associated with obesity in adulthood.^{1,2} Obese children are at risk of metabolic syndrome, cardiovascular diseases, and increased adult morbidity and mortality.^{3,4}

Adipokines are hormones secreted by adipose tissue that play a role in metabolic homeostasis.⁵ Obesity also induces production of inflammatory cytokines and infiltration of immune cells into adipose tissue, determining a state of chronic low-grade inflammation. Metabolic inflammation has been recognized as a unifying mechanism linking obesity to a broad spectrum of conditions, such as atherosclerosis, type 2 diabetes, and systemic vascular complications.⁵⁻⁷

The current study analyzed plasma levels of adipokines (adiponectin, resistin, and leptin), and soluble tumor necrosis factor receptor type 1 (sTNFR1), insulin sensitivity, and lipid metabolism in overweight and obese children and adolescents in comparison with lean individuals. The authors

also assessed the relationships of these molecules with classical metabolic risk factors. Circulating levels of sTNFR1 are regarded as inflammatory markers, reflecting TNF- α activity better than the measurement of TNF- α itself.⁵⁻⁹ It was hypothesized that adipokines, low-grade inflammation, insulin sensitivity, and lipid metabolism gradually change from lean to overweight and from overweight to obesity.

Methods

Subjects

This cross sectional study had a convenience sample of 104 children and adolescents, aged 6–18 years old. All individuals who fulfilled the inclusion criteria and accepted taking part in the study were recruited from the Pediatric Endocrinology Service and the Pediatric Primary Care Center of the institution for two years. Therefore, 50 obese, 30 overweight, and 24 lean individuals were evaluated.

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