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ORIGINAL ARTICLE

Correlation of BMI Z-scores with glucose and lipid profiles among overweight and obese children and adolescents^{☆,☆☆}

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KEYWORDS

Obesity;
Overweight;
Dyslipidemias;
Insulin resistance;
Child;
Adolescent

Abstract

Objective: To evaluate the prevalence of abnormalities in plasma lipid and glucose profiles among overweight and obese children and adolescents, and to assess the presence of a correlation between BMI Z-scores and indicators of comorbidities related to both profiles.

Methods: This was a multicenter cross-sectional study conducted at two outpatient clinics. The study included all 417 comers for the first visit from 2008 to 2012, aged between 7 and 18 years, with BMI above the Z-score +1. Anthropometry and blood sampling were obtained. The prevalence of dyslipidemias, hyperglycemia, and insulin resistance were evaluated, together with the correlations of these variables with the increase of Z-BMI.

Results: Dyslipidemia was observed in 43.4% of the boys and 66.1% of the girls, with no difference between genders. High glucose levels were detected in 6.2% of the individuals. Insulin resistance was present in 32.3% and 41.7% of the cases, with no statistical significance between boys and girls. Correlations between the Z-BMI were noted for triglycerides in the entire group and among girls; for HDL-c, only among girls; for glucose, a correlation was observed for the entire group, but not when stratified by gender. The indicators of insulin resistance were all correlated with Z-BMI, even when corrected for age.

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☆☆ Study conducted at Universidade de São Paulo (USP), Ribeirão Preto, SP; and Universidade Federal do Rio Grande do Sul (UFRGS), Porto Alegre, RS, Brazil.

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58**PALAVRAS-CHAVE**

Obesidade;
Sobrepeso;
Dislipidemias;
Resistência à insulina;
Criança;
Adolescente

Conclusions: Overweight and obesity give origin to a high prevalence of dyslipidemia and insulin resistance. BMI Z-scores showed a weak positive correlation with glucose and triglyceride, and negative with HDL-c. In turn, the strongest positive correlation was found with insulin resistance indicators.

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Correlação dos escores z de IMC com os perfis glicêmico e lipídico entre crianças e adolescentes com sobrepeso e obesidade

Resumo

Objetivo: Avaliar a prevalência de anormalidades nos perfis lipídico e glicêmico entre crianças e adolescentes com sobrepeso e obesidade e também verificar se existe correlação entre os escores z de índice de massa corporal (z-IMC) e indicadores de comorbidades ligados a esses perfis.

Métodos: Estudo de corte transversal multicêntrico, incluindo-se 417 pacientes com idades entre 7 e 18 anos e IMC acima do escore $z > +1$, que fizeram a consulta de caso novo entre os anos de 2008 e 2012. Antropometria e coleta de sangue foram realizadas. As prevalências de dislipidemia, hiperglicemia e resistência insulínica foram avaliadas, juntamente com as correlações entre essas variáveis e o z-IMC.

Resultados: Dislipidemia foi encontrada em 43,4% dos meninos e 66,1% das meninas, sem diferença entre os sexos. Hiperglicemia foi encontrada em 6,2% dos indivíduos. Resistência insulínica esteve presente entre 32,3 e 41,7% dos casos, sem diferença estatística entre os sexos. Foi observada correlação com z-IMC para triglicérides quando considerado o grupo todo e entre as meninas; e para HDL-c, apenas entre as meninas. A glicemia apresentou correlação quando considerado o grupo todo, mas não quando separados por sexo. Os indicadores de resistência insulínica estiveram todos correlacionados com IMC, mesmo quando se executou correção para a idade.

Conclusões: Sobrepeso e obesidade levam a prevalências elevadas de dislipidemia e resistência insulínica. Os escores z de IMC mostraram discreta correlação positiva com glicose e triglicérides e negativa com HDL-c. Por outro lado, correlação positiva mais forte foi observada com os indicadores de resistência insulínica.

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Introduction

The increasing prevalence of obesity in childhood and adolescence demands from researchers and stakeholders in public health the establishment of criteria to prioritize actions to address this problem.¹ Different authors have demonstrated the presence of cardiovascular risk factors associated with obesity, especially dyslipidemia² and insulin resistance³; however, the numbers are quite variable and the prevalence is not yet known.⁴ For population studies, body mass index (BMI) has been used as indicator that is capable of reflecting body adiposity⁵; starting from the Z-score of +1, which defines overweight, it may be understood that the higher the value, the more severe the situation.⁶ In this sense, it is relevant to know not only the prevalence, but also how the comorbidities related to overweight behave as the situation worsens, and what are the differences between boys and girls. Some authors have evaluated this issue. Ricco et al.⁷ studied 34 overweight and 50 obese subjects aged 6–18 years comparing blood pressure, fasting glucose, second-hour blood glucose, total cholesterol (TC), HDL-c, LDL-c, and triglycerides (TG). Only HDL-c

was slightly elevated in overweight patients ($p=0.048$), demonstrating that, for the parameters evaluated, having a higher BMI did not substantially impact on the comorbidities. Lima et al.⁸ also found no impact in the lipid profile comparing overweight and obese children and adolescents. In turn, when considered as a continuum (assessed through elevation of BMI Z-scores), different results were observed. Bell et al.⁹ demonstrated a correlation between increased obesity and *acanthosis nigricans*, depression, anxiety, headache, muscle pain, and sleep apnea. Correlations with dyslipidemia,¹⁰ insulin resistance,¹¹ and steatosis have also been demonstrated.¹²

This study intended to evaluate the prevalence of abnormalities in plasma lipid and glucose profiles among overweight and obese children and adolescents, and to assess the presence of a correlation between BMI Z-scores and indicators of comorbidities related to both profiles.

Methods

This was a multicenter cross-sectional study, conducted in two outpatient clinics: the Centro de Estudos em Saúde e

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