



ORIGINAL ARTICLE

Pro-inflammatory triggers in childhood obesity: Correlation between leptin, adiponectin and high-sensitivity C-reactive protein in a group of obese Portuguese children



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KEYWORDS

Pediatric;
Obesity;
High-sensitivity
C-reactive protein;
Adiponectin;
Leptin

Abstract

Introduction: Pediatric obesity is increasingly prevalent in the Portuguese population. Adipocyte dysfunction results in the expression of pro-inflammatory mediators that are responsible for the low-grade inflammatory process that characterizes obesity.

Objectives: The aim of this study was to investigate the relationship between markers of adiposity, inflammation and adipokines in a Portuguese obese pediatric population.

Methods: One hundred and twenty children of both sexes, aged 6–17 years, were included in this study. The control group consisted of 41 healthy normal-weight children. The variables analyzed were age, gender, body mass index, waist circumference, fat mass percentage, high-sensitivity C-reactive protein (hs-CRP), leptin and adiponectin.

Results: There were significant differences between controls and obese children for all parameters analyzed. In the obese group, after controlling for age and gender, hs-CRP ($p=0.041$), adiponectin ($p=0.019$) and leptin ($p<0.001$) still showed significant statistical differences. A direct correlation was found between hs-CRP, leptin, body mass index and waist circumference, the strongest being with leptin ($r=0.568$; $p<0.001$). This trend remained statistically significant, regardless of gender or pubertal age.

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PALAVRAS-CHAVE

Pediatria;
 Obesidade;
 Proteína-C-reativa
 ultrasensível;
 Adiponectina;
 Leptina

Conclusions: Considering the role of leptin, adiponectin and hs-CRP in the genesis of endothelial dysfunction, they may be used in clinical practice for risk stratification, as well as in the assessment of weight control programs.

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Fatores pró-inflamatórios na obesidade infantil: correlação entre a leptina, adiponectina e proteína C-reativa num grupo de crianças portuguesas obesas

Resumo

Introdução: A obesidade pediátrica é prevalente na nossa população. A adiposidade resulta na expressão de marcadores pró-inflamatórios que são responsáveis pelo processo de inflamação de baixo grau que caracteriza a obesidade.

Objetivos: Tivemos como objetivo avaliar a relação entre marcadores de adiposidade, inflamação e adipocinas num grupo de crianças portuguesas obesas.

Métodos: Foram incluídas no estudo 120 crianças obesas, entre os 6 e 17 anos de idade. O grupo controlo continha 41 crianças saudáveis, sem excesso de peso, dentro da mesma faixa etária. As variáveis analisadas foram: idade, género, índice de massa corporal, circunferência abdominal, percentagem de massa gorda, proteína C-reativa ultra-sensível, leptina e adiponectina.

Resultados: Todos os parâmetros analisados encontravam-se significativamente mais elevados no grupo de crianças obesas. No grupo obeso, após avaliação por regressão logística, ajustando à idade e género, a proteína C-reativa ultra-sensível ($p=0,041$), adiponectina ($p=0,019$) e leptina ($p<0,001$), mantiveram significado estatístico. Os marcadores de adiposidade correlacionaram-se diretamente com a leptina ($p=0,001$) e inversamente com a adiponectina ($p=0,029$). Encontrámos também uma correlação direta entre a proteína C-reativa ultra-sensível, leptina, índice de massa corporal e circunferência abdominal, sendo a correlação mais robusta com a leptina ($\rho=0,568$; $p<0,001$). Esta tendência manteve-se independentemente do género ou idade puberal.

Conclusões: Considerando a relação da leptina, adiponectina e proteína C-reativa na génese da disfunção endotelial, estes poderão ser úteis na prática diária para estratificação de risco, assim como, para avaliar medidas implementadas nos programas para redução de peso em crianças obesas.

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Abbreviations

BMI	body mass index
FM%	fat mass percentage
hs-CRP	high-sensitivity C-reactive protein
TNF- α	tumor necrosis factor alpha
WC	waist circumference

Introduction

Obesity is considered an independent cardiovascular risk factor,^{1,2} and in the adult population its relationship with cardiovascular disease is well established. Due to its prevalence, childhood obesity is considered an epidemic by the World Health Organization.³ About 10% of the world's pediatric population is overweight or obese, and it is estimated that 40% of these will be obese as adults.⁴

In children, obesity is defined by a body mass index (BMI) above the 95th percentile for age and gender.⁵ However, various studies have shown that body fat distribution, particularly visceral fat, rather than BMI, is linked to cardiovascular events.^{6,7} About 85% of adipose tissue is subcutaneous, the remainder being located in the abdominal cavity, both intra- and retroperitoneally, and this relationship is maintained regardless of the individual's weight. Magnetic resonance imaging and computed axial tomography are the gold standard references used to quantify visceral fat. However, in clinical practice, access to these exams is limited, and hence waist circumference (WC) is used to infer visceral fat,⁸ with which it is strongly correlated, as well as having predictive value regarding cardiovascular events.

Adipose tissue is a metabolically active organ that produces various bioactive substances, known as adipokines, involved in metabolic, endocrine and immunological processes.^{9,10} Of these substances, leptin and adiponectin are the most specifically related to adipose tissue.

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