Revista Portuguesa de
Cardiologia
Portuguese Journal of Cardiology

www.revportcardiol.org

ORIGINAL ARTICLE

Body adiposity is associated with risk of high blood pressure in Portuguese schoolchildren

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Abstract
Objective: The aim of the study was to estimate the prevalence of high blood pressure (HBP) and its association with anthropometric indicators of adiposity in Portuguese schoolchildren.
Methods: In this cross-sectional study, a nationally representative sample of 6-9-year-old children was analyzed. Weight and height (used to calculate body mass index [BMI]), blood pressure (BP), waist circumference (WC) and skinfold thickness (used to estimate body fat percentage [BFP]) were measured using standard techniques. BP was classified as high-normal BP or hypertension for values between the 90th and 95th percentiles or above the 95th percentile, respectively. A body adiposity index was calculated with principal component analysis using BMI, WC and BFP. Multinomial logistic regression models were used to estimate the strength of the association between anthropometric indicators and HBP.
Results: The prevalence of high-normal BP and hypertension was 4.5% and 3.7%, respectively. BP was positively correlated with all anthropometric indicators (p < 0.01 for all). HBP was significantly more prevalent in females than in males and was positively associated with higher values of the assessed anthropometric indicators of adiposity, especially among females.
Conclusion: Increased body fat predicted HBP. The use of anthropometric indicators may thus be useful in screening for HBP among Portuguese schoolchildren.
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PALAVRAS CHAVE
Pressão arterial;
Escolares;
Adiposidade;
Condição de peso

Adiposidade corporal está associada com o risco de pressão arterial elevada em escolares portugueses

Resumo

Objetivo: Estimar a prevalência de hipertensão arterial sistêmica (HAS) e sua associação com indicadores antropométricos de adiposidade em escolares portugueses.

Métodos: Neste estudo transversal, uma amostra nacionalmente representativa de crianças de seis a nove anos foi avaliada. As medidas de peso e altura (usadas para estimar o índice de massa corporal [IMC]), pressão arterial [PA], circunferência da cintura [CC] e dobras cutâneas {usadas para estimar o percentual de gordura corporal – PBF}) foram aferidas com procedimentos-padrão. A HAS foi classificada em pressão arterial normal-alta ou hipertensão para valores entre os percentis 90 e 95 ou acima do percentil 95, respectivamente. Um índice de adiposidade foi estimado por meio da análise de componentes principais com o uso de IMC, CC e BFP. Modelos de regressão logística multinomial foram usados para estimar a magnitude da associação entre indicadores de adiposidade e HAS.

Resultados: As prevalências de pressão arterial normal-alta e hipertensão foram de 4,5 e 3,7%, respectivamente. A HAS foi positivamente correlacionada com todos os indicadores de adiposidade (p < 0,01 para todos). HAS foi significativamente maior em meninas do que em meninos e foi positivamente associada com o aumento dos indicadores antropométricos de adiposidade, especialmente entre as meninas.

Conclusão: O aumento da gordura corporal pode predizer HAS. Assim, o uso de indicadores antropométricos para adiposidade pode ser útil na triagem de HAS em escolares portugueses.

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Introduction

The growing childhood obesity epidemic[1] is concerning, especially because obese children may experience metabolic complications and are at high risk for the early development of conditions that are more commonly observed in adults,[2] particularly high blood pressure (HBP), changes in serum triglycerides and elevated fasting glucose.[3]

The prevalence of childhood hypertension had been expected to be approximately 1-2%,[4] however, rates ranging from 3.0 to 15.9% have been observed in different scenarios,[5-19] and this rise is associated with increases in excess weight,[2,3,18,19] increased abdominal fat,[7,9-14,17] and unhealthy lifestyles.[9,10,15,20]

Additionally, hypertension in childhood has important implications for children's health, since it is commonly related to the development of other cardiovascular risk factors[3,21] and can persist into adulthood.[22,23] However, although early diagnosis of hypertension in children is of the utmost importance[24] and blood pressure (BP) measurement is a low-cost, noninvasive and relatively accurate procedure for identifying this condition,[25] little is known about the risk factors associated with HBP in childhood.

The aim of this study was to estimate the prevalence of HBP and its association with anthropometric indicators of adiposity in Portuguese schoolchildren.

Methods

Sampling method

The present study used a subsample of the Portuguese Prevalence Study of Obesity in Childhood (PPSOC),[26,27] a cross-sectional study carried out between March 2009 and January 2010 investigating a randomly selected sample from public and private schools in mainland Portugal. The study was designed to obtain a nationally representative sample of 3-10-year-old children living in mainland Portugal. The sampling design was stratified proportionally according to the age and gender of the children in each district. Details of the study design and sampling process can be found elsewhere.[26,27] This study included a subsample of 1555 6-9-year-old children from the 18 districts in Portugal.

Data collection

A questionnaire designed specifically for this research was applied to the children's parents and included questions on demographic and socioeconomic characteristics, lifestyle-related behaviors, and health and nutrition. A pilot test was conducted on a group of children similar to those in the study, and the questionnaire was revised based on the pilot results. To reduce the non-response rate, three visits were