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ORIGINAL ARTICLE

Positive association between waist-to-height ratio and hypertension in adolescents☆

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KEYWORDS
Waist-to-height ratio;
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Abstract
Introduction: The obesity and overweight epidemic, together with increasing cardiovascular disease, represent a major public health problem worldwide, and their occurrence in childhood and adolescence has increased in recent decades. The objective of this study was to assess the association between waist-to-height ratio (WHR) and the incidence of hypertension in adolescents.
Methods: We performed a cross-sectional study of adolescents aged 10-17 years of both sexes attending municipal schools in inland Rio Grande do Sul, Brazil. Using a secondary database, weight and height measurements, blood pressure, and waist circumference (WC) were analyzed and body mass index (BMI) and WHR were calculated. Blood pressure was classified according to the Brazilian hypertension guidelines, BMI according to the curves of the World Health Organization, and WC according to Taylor et al. The cutoff used for WHR was 0.50 for both sexes.
Results: Of the 1030 adolescents studied, 29.6% (305) presented overweight/obesity and 30.4% (313) had hypertension; 24% (247) had high WC and 18.3% (189) presented high WHR. Participants with WHR $\geq$0.50 were 2.4 times more likely to have hypertension than those with WHR <0.50 (OR 2.39; 95% CI 1.73-3.32; p<0.001).
Conclusion: A positive association was found between WHR and the presence of hypertension in adolescents.

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PALAVRAS-CHAVE
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Associação positiva entre razão cintura-estatura e presença de hipertensão em adolescentes

Resumo
Introdução: A epidemia de sobrepeso e obesidade, assim como as doenças cardiovasculares, representam um importante problema de saúde pública em todo mundo e a sua prevalência na infância e adolescência vem aumentando nas últimas décadas. O objetivo deste estudo foi avaliar a possível associação entre a razão cintura/estatura (RCE) e a presença de hipertensão (HAS) em adolescentes.
Métodos: Estudo transversal envolvendo adolescentes com idade entre 10-17 anos, de ambos os gêneros, pertencentes a escolas municipais do interior do Rio Grande do Sul, Brasil. A partir de banco de dados secundário, foram analisadas as medidas de peso, estatura, pressão arterial e circunferência da cintura (CC), calculou-se o índice de massa corporal (IMC) e a RCE. A classificação da pressão arterial foi feita de acordo com as V Diretrizes Brasileiras de Hipertensão Arterial; o IMC foi classificado de acordo com as curvas da Organização Mundial da Saúde; a CC foi classificada conforme a recomendação de Taylor et al.; e o ponto de corte utilizado para a RCE foi de 0,50 para ambos os gêneros.
Resultados: Foram estudados 1030 adolescentes, dentre os quais 29,6% (n = 305) apresentavam sobrepeso/obesidade e 30,4% (n = 313) hipertensão; 24% (n = 247) dos adolescentes apresentaram CC elevada e 18,3% (n = 189) apresentaram RCE elevada. Participantes com RCE > 0,50 apresentaram uma chance 2,4 vezes maior de HAS, em comparação àqueles com RCE < 0,50 (OR = 2,39; IC95% 1,73 - 3,32; p < 0,001).
Conclusão: Associação positiva entre RCE e presença de HAS em adolescentes foi observada.

Introduction

Cardiovascular disease (CVD) is the leading global cause of morbidity and mortality.[1] The obesity and overweight epidemic, together with increasing cardiovascular disease, represent a major public health problem worldwide.[2,3] Although the clinical manifestations of CVD are generally not seen until adulthood, studies have shown that comorbidities such as dyslipidemia, hypertension and insulin resistance may be present in childhood or adolescence, and that the greater the number of risk factors, the greater the likelihood of developing CVD at a young age.[4,5]

Obesity is a metabolic disorder characterized by excessive body fat and a chronic inflammatory state.[6] There are two types of obesity, central and peripheral. Abdominal obesity is now considered the main risk factor for hypertension in children and adolescents, as confirmed in a cross-sectional study of 1716 adolescents in the city of Cuiabá, Mato Grosso, Brazil.[7,8] When adjusted for age, gender and skin color, hypertension was associated with obesity (odds ratio [OR] 2.27; 95% confidence interval [CI] 1.64-3.14) but not with waist circumference (WC) after adjustment for body mass index (BMI).[9]

Of the indicators used to assess body fat, the waist-to-height ratio (WHR) is a simple and practical tool that uses WC as a measure of abdominal adiposity adjusted to the size of the individual by dividing WC by height.[10] WC and WHR are considered important measures to identify overweight adolescents at high cardiometabolic risk.[11] Studies have demonstrated that anthropometric indicators can predict hypertension in adolescents.[12–15]

The objective of this study was to assess the association between WHR and the incidence of hypertension in adolescents.

Methods

We performed a cross-sectional observational study involving 1030 adolescents aged 10-17 years of both sexes attending municipal schools in inland Rio Grande do Sul, Brazil. The data were extracted from a secondary database established in 2012 and derived from a study which included all students enrolled in municipal schools in September and October 2012 of both sexes and aged between 10 and 17 years. The study was approved by the research ethics committee of Univates, protocol no. 72871 and 151/10, and written informed consent was obtained from parents and guardians. Children not present on the day of data collection, and those who refused or failed to participate in any stage of the study, were excluded.

Blood pressure (BP) was measured using an automatic sphygmomanometer (Omron HEM-742INT) in accordance with the guidelines of the Brazilian Society of Cardiology.[3] Subjects were seated in a calm and quiet environment for at least 5 min before assessment, with legs uncrossed and feet flat on the floor, in a chair with their back supported and relaxed, clothing removed from the arm on which the cuff was placed, with the arm supported, hand at the level of the heart and palm upward. They were told not to speak during BP measurement. Those who had physical exercise classes on the day of data collection had their BP measured