



ORIGINAL ARTICLE

Evidence of underdiagnosis and markers of high blood pressure risk in children aged 6 to 13 years^{☆,☆☆}

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KEYWORDS

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Risk marker

Abstract

Objective: to estimate the prevalence of high blood pressure (BP) in schoolchildren, as well as the reported frequency of previous measurements of BP in these children, and to identify high BP risk markers in the sample.

Methods: this was a cross-sectional study involving 794 children aged 6 to 13 years, enrolled in public elementary schools. A questionnaire was given to parents/guardians, consisting of perinatal, socioeconomic data, and information on previous measurements of BP in these children. Anthropometric measurements included weight, height, waist, hip, and arm and neck circumference, in addition to the three BP measurements. Classification of BP levels was carried out according to current international recommendations, established in 2004.

Results: the prevalence of high BP (hypertension or prehypertension) was 7%. Only 21.7% of children had previously undergone BP measurements. The odds ratio of high BP among children with and without overweight was 2.9 (95% CI = 1.7 to 5.0, $p < 0.001$). None of the anthropometric measurements was superior to the Z-score of BMI as a predictor of high BP. History of hypertension during pregnancy ($p < 0.001$), prematurity ($p = 0.006$), maternal hypertension ($p = 0.01$), and paternal hypertension ($p = 0.008$) were also correlated with the presence of high BP in children. **Conclusions:** overweight and family history constitute the main risk markers of high BP in children. The low frequency of BP measurement in children observed in this municipality contributes to the underdiagnosis of the disease, with irreversible consequences for these individuals.

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^{☆☆} Study conducted at Universidade Vila Velha - ES (UVV-ES), Vitória, ES, Brazil.

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PALAVRAS-CHAVE

Hipertensão arterial;
Crianças;
Obesidade;
Marcador de risco

Evidências de subdiagnóstico e marcadores de risco de pressão arterial elevada em crianças de 6 a 13 anos**Resumo**

Objetivo: estimar a prevalência de pressão arterial (PA) elevada em escolares, assim como a frequência relatada de aferição prévia da PA nessas crianças. Identificar marcadores de risco de PA elevada na amostra.

Métodos: estudo transversal envolvendo 794 crianças de 6 a 13 anos, matriculadas no ensino público fundamental. Questionário entregue aos pais, com informações perinatais, sócio-econômicas e sobre aferição prévia da PA nas crianças. Avaliação antropométrica: peso, altura, circunferências abdominal, de quadril, braquial e cervical, além das três aferições da pressão arterial. Classificação dos níveis pressóricos conforme as recomendações internacionais atuais, estabelecidas em 2004.

Resultados: a prevalência de PA elevada (hipertensão ou pré-hipertensão) foi de 7%. Apenas 21,7% das crianças haviam sido previamente submetidas a aferições de PA. A razão de chances de PA elevada entre crianças com e sem excesso de peso foi de 2,9 (IC 95% = 1,7 a 5,0, $p < 0,001$). Nenhuma das medidas antropométricas foi superior ao Z de IMC como preditor de PA elevada. Histórico de hipertensão na gestação ($p < 0,001$), de prematuridade ($p = 0,006$), hipertensão materna ($p = 0,01$) e hipertensão paterna ($p = 0,008$) também se correlacionaram à presença de PA elevada nas crianças.

Conclusões: excesso de peso e história familiar configuram como principais marcadores de risco de PA elevada em crianças. A baixa frequência de aferição da PA observada em crianças deste município contribui para o subdiagnóstico da doença, com consequências futuras irreversíveis para esses indivíduos.

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Introduction

Systemic arterial hypertension (SAH) is considered a public health problem both in Brazil and worldwide. The early diagnosis and treatment of this disease are essential for reducing associated cardiovascular risks.

Until recently, SAH was considered nonexistent in the pediatric age range. Early studies of normal range blood pressure (BP) in children started in the late 1970s,¹ and since then, several reviews have been performed.²⁻⁴ The currently used references were developed by The National High Blood Pressure Education Program of the United States in 2004, establishing the 50th, 90th, 95th, and 99th percentiles, adjusted according to gender, age, and height percentiles, and defining that values of systolic BP (SBP) and/or diastolic BP (DBP) are compatible with SAH when \geq 95th percentile.⁴

It is estimated that over half of cases of SAH in children aged \geq 7 years are of the essential type, and there is evidence that SAH in adults may have originated in childhood, thus contributing to the occurrence of early complications and adverse events in young adults.^{5,6} Additionally, complications such as left ventricular hypertrophy, hypertensive encephalopathy, and cerebrovascular accidents consequent to SAH have been reported even in the pediatric age range.^{7,8}

Despite current recommendations for BP to be assessed annually from age 3 years,⁴ there is evidence that undervaluation and underdiagnosis are predominant in many health services in Brazil, resulting in irreversible future risks for these individuals.^{9,10}

In the state of Espírito Santo, Brazil, data on the magnitude of the problem of high BP in children are scarce, and in the city of Vila Velha, they are absent. As a result, little or no attention has been given by the public health policies to this problem, whose worldwide impact is increasingly evident. Thus, the objectives of this study were to estimate the prevalence of elevated BP levels in children enrolled in primary schools in the city of Vila Velha, Brazil, to estimate the reported frequency of previous measurements of BP in these children, to identify anthropometric predictors associated with a higher risk of high BP, and to evaluate the presence of an association between high BP and socioeconomic, perinatal, and family characteristics in the sample.

Methods

The study was approved by the Research Ethics Committee of the Universidade Vila Velha in October of 2011. It was a cross-sectional study of children enrolled in the municipal elementary school units (unidades municipais de ensino fundamental - UMEFs) of Vila Velha, the most densely inhabited city in the state of Espírito Santo, Brazil, in 2012. The first stage of sampling consisted of random selection, by drawing lots, of a school from each of the five political-geographical regions of the city. In the second stage, an unsystematic selection of students from each school was performed, according to their adherence to the study and consent from parents or guardians.

The unsystematic rather than random selection is justified by exhaustive attempts at randomization, which were abandoned due to the difficulty in obtaining informed

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