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## ORIGINAL ARTICLE

### Factors associated with abdominal obesity in children



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Received 5 January 2015; accepted 21 April 2015

Available online 24 August 2015

#### KEYWORDS

Nutritional  
epidemiology;  
Children;  
Abdominal obesity;  
Waist circumference

#### Abstract

**Objective:** To identify the association of dietary, socioeconomic factors, sedentary behaviors and maternal nutritional status with abdominal obesity in children.

**Methods:** A cross-sectional study with household-based survey, in 36 randomly selected census tracts in the city of Santos, SP. 357 families were interviewed and questionnaires and anthropometric measurements were applied in mothers and their 3–10 years-old children. Assessment of abdominal obesity was made by maternal and child's waist circumference measurement; for classification used cut-off points proposed by World Health Organization (1998) and Taylor et al. (2000) were applied. The association between variables was performed by multiple logistic regression analysis.

**Results:** 30.5% of children had abdominal obesity. Associations with children's and maternal nutritional status and high socioeconomic status were shown in the univariate analysis. In the regression model, children's body mass index for age (OR=93.7; 95%CI 39.3–223.3), female gender (OR=4.1; 95%CI 1.8–9.3) and maternal abdominal obesity (OR=2.7; 95%CI 1.2–6.0) were significantly associated with children's abdominal obesity, regardless of the socioeconomic status.

**Conclusions:** Abdominal obesity in children seems to be associated with maternal nutritional status, other indicators of their own nutritional status and female gender. Intervention programs for control of childhood obesity and prevention of metabolic syndrome should consider the interaction of the nutritional status of mothers and their children.

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DOI of original article: <http://dx.doi.org/10.1016/j.rpped.2015.04.002>

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**PALAVRAS-CHAVE**

Epidemiologia nutricional;  
Crianças;  
Gordura abdominal;  
Circunferência da cintura

**Fatores associados ao acúmulo de gordura abdominal em crianças****Resumo**

**Objetivo:** Identificar fatores individuais (dietéticos, comportamento sedentário) e familiares (estado nutricional materno e nível socioeconômico) associados com o acúmulo de gordura abdominal de crianças.

**Métodos:** Estudo de delineamento transversal de base domiciliar, em 36 setores censitários sorteados aleatoriamente na cidade de Santos/SP. Foram entrevistadas 357 famílias para aplicação de questionários e aferição de medidas antropométricas em mães e crianças de 3-10 anos. A avaliação do acúmulo de gordura abdominal foi feita pela medida da circunferência da cintura de mães e crianças com o uso da recomendação da Organização Mundial da Saúde (1998) e a proposta de Taylor et al. (2000), respectivamente. A associação entre as variáveis foi verificada por meio de regressão logística múltipla.

**Resultados:** Verificou-se que 30,5% das crianças apresentaram acúmulo de gordura abdominal. Na análise univariada, o acúmulo de gordura abdominal esteve associado ao estado nutricional materno e da criança e ao nível socioeconômico elevado. Na análise multivariada, foram observadas associações com excesso de peso pelo índice de massa corporal para idade (OR=93,7; IC95% 39,3-233,3); ser do sexo feminino (OR=4,1; IC95% 1,8-9,3) e acúmulo de gordura abdominal materno (OR=2,7; IC95% 1,2-6); independentemente do nível socioeconômico.

**Conclusões:** O acúmulo de gordura abdominal em crianças mostrou-se associado ao estado nutricional materno, aos indicadores de seu próprio estado nutricional e ao sexo feminino. Programas de intervenção para controle da obesidade infantil e prevenção da síndrome metabólica relacionada ao acúmulo de gordura abdominal devem levar em consideração a interação do estado nutricional de mães e seus filhos.

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**Introduction**

The worldwide obesity epidemic is increasing at an alarming rate in childhood and can be observed in developing countries, which have shown an increase in the prevalence of childhood obesity in recent decades.<sup>1</sup> In Brazil, a study with a sample of children aged 7–10 years showed a prevalence of overweight and obesity of 26.7% for boys and 34.6% for girls.<sup>2</sup>

As a consequence of excess weight, abdominal obesity is associated with cardiovascular risk factors and metabolic disorders, which may already be present in childhood.<sup>3,4</sup> Abdominal obesity is understood as the accumulation of fat in the abdominal region assessed by an anthropometric and/or body composition measure that shows a value above a specific and sensitive cutoff point.<sup>4</sup> Among the methods used for the diagnosis, waist circumference (WC), widely used in the assessment of nutritional status in adults, has been also used in children.<sup>4,5</sup> Studies with different populations have proposed distributions in percentiles and cutoffs for WC in children, but there is still no consensus about the criteria used for the assessment of this group.<sup>4</sup>

The accuracy of the WC measurement when compared to other methods of nutritional status assessment in children, such as the body mass index (BMI) and the waist/height ratio (WHR), was evaluated in studies of which results showed the use of this measure in high blood pressure risk identification in combination with BMI or as a factor associated with dyslipidemia and hyperglycemia.<sup>6,7</sup>

Some factors associated with excess weight and abdominal obesity in children, described in the scientific literature, are: the family's socioeconomic status,<sup>8</sup> parents' nutritional status,<sup>9</sup> and children's sedentary behaviors.<sup>10</sup> It is also known that unhealthy eating habits and high intake of macronutrients are possible causes of abdominal obesity.<sup>3</sup> However, few studies have employed the WC to determine abdominal fat in Brazilian children as the outcome of interest, and to investigate the possible associated factors. The aim of this study is to assess the association of dietary and socioeconomic factors, sedentary behaviors and maternal nutritional status with abdominal obesity in children aged 3–10 years in Santos city, state of São Paulo, Brazil.

**Method**

This study is part of the research project "Nutritional Environment Assessment in the city of Santos" (AMBNUT), approved by the Institutional Review Board of Universidade Federal de São Paulo (Processes: 275/2009 and 276/2009) and funded by Fundação de Amparo a Pesquisa do Estado de São Paulo (FAPESP) (process n.: 2009/01361-0). This was a cross-sectional, household-based project, carried out from January to December 2010, when two visits were made to the households to collect socioeconomic and anthropometric data, as well as information on the families' health and food habits.

According to data from the Brazilian Institute of Geography and Statistics (Instituto Brasileiro de Geografia e

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