REVISTA PAULISTA DE PEDIATRIA

www.rpped.com.br

ORIGINAL ARTICLE

Metabolic syndrome risk assessment in children: use of a single score

Julia Khéde Dourado Villa[a]**, Angélica Ribeiro e Silva**[b]**, Thanise Sabrina Souza Santos**[a]**,
Andréia Queiroz Ribeiro**[a]**, Luciana Ferreira da Rocha Sant'Ana**[a]

[a] *Universidade Federal de Viçosa (UFV), Viçosa, MG, Brazil*
[b] *Universidade Federal de Minas Gerais (UFMG), Belo Horizonte, MG, Brazil*

Abstract
Objective: To calculate a score of metabolic syndrome (MetS) in children and set a cutoff point of this score for the prediction of MetS risk.
Methods: The study included a random sample of 348 children aged 8 and 9 years of Viçosa, Southeast Brazil. Factor analysis by principal components (PCA) was used to determine, among various risk factors, those with higher degrees of intercorrelation. The chosen variables were: waist circumference (PC), homeostatic model assessment of insulin resistance (HOMA), high density lipoprotein (HDL), triglycerides (TAG) and mean arterial pressure (MAP). Z-scores were created for each one of these parameters and the sum of these z-scores constituted the MetS score. The receiver operating characteristic (ROC) curve was used to identify the cutoff of MetS score, using as gold standard the presence or absence of MetS determined according to criteria age-modified.
Results: The prevalence of MetS in the sample was 8.9% by adopting specific criteria for age, and 24% when considering the cutoff of MetS score. The selected cutoff point of 1.86 was accurate to predict the MetS risk in this sample due to its high sensitivity (96.7%), specificity (82.7%) and AUC of 0.96.
Conclusions: This original Brazilian study presents the MetS score as a suitable alternative for the study of Metabolic Syndrome in children, given the lack of consensus for the definition of this syndrome in childhood.
© 2015 Sociedade de Pediatria de São Paulo. Published by Elsevier Editora Ltda. All rights reserved.

Risco de síndrome metabólica em crianças: a utilização de um escore único

Resumo

Objetivo: Calcular um escore de síndrome metabólica (SM) em crianças e definir um ponto de corte para a predição de risco de SM nesse grupo.

Métodos: Estudo com amostra aleatória de 348 crianças de 8 e 9 anos do município de Viçosa. Análise fatorial por componentes principais foi utilizada para verificar, entre vários fatores de risco, aqueles com maiores graus de intercorrelação, sendo estes: perímetro da cintura (PC), modelo homeostático de resistência à insulina (HOMA), lipoproteína de alta densidade (HDL), triacilgliceróis (TAG) e pressão arterial média (PAM). Escores-z foram criados para cada um desses parâmetros e o somatório destes constituiu o escore de SM. A curva *receiver operating characteristic* (ROC) foi utilizada para identificar o ponto de corte do escore, considerando-se como padrão-ouro a presença ou ausência de SM, segundo critérios modificados para a idade.

Resultados: A prevalência de SM na amostra foi de 8,9% adotando-se critérios específicos para a idade, e de 24% quando considerado o ponto de corte do escore. Foi eleito o ponto de corte de 1,86, por possuir elevadas sensibilidade (96,7%) e especificidade (82,7%), AUC de 0,96, e assim, acurácia em predizer a presença de síndrome metabólica em crianças nessa faixa etária.

Conclusões: Este inédito estudo brasileiro apresenta uma alternativa adequada para o estudo da SM em crianças, visto a ausência de definição consensual para a SM na infância.

Introduction

Metabolic syndrome (MetS) is a condition consisting of several risk factors for cardiovascular disease and diabetes mellitus type 2.[1] The etiology of MetS is not fully known, but probably represents a complex interaction between genetic, metabolic, environmental and dietary factors.[2] Its clinical diagnosis, which has already been established for adults, is based on metabolic abnormalities that include abdominal obesity, dyslipidemia, high blood pressure (BP) and hyperglycemia.[3]

The extent of child obesity in Brazil can be demonstrated with data from the Pesquisa de Orçamentos Familiares (POF) carried out in the years 2008 and 2009, which showed that 33.5% of Brazilian children aged five to nine years had excess weight.[4] Therefore, it is not surprising that some studies indicate the onset of MetS changes in childhood similar to those found in adults;[5,6] however, there is no consensus for the diagnosis of MetS in children.

Considering these facts, many authors have used a MetS score[7-16] comprising a numerical representation of the combination of metabolic and cardiovascular risk factors. However, to date, no studies have been found in Brazil that used this score. As it is a continuous variable, the MetS score is a measure that has greater statistical power when compared to the dichotomous classification of MetS (presence/absence).[16,17] The use of the MetS score presupposes that the increased cardiovascular risk occurs due to the altogether progressive increase of the MetS parameters.[18]

Considering the increase in obesity and associated complications in children, the lack of a consensus definition for MetS at this age range, and cardiovascular risk as a progressive function of the several components of MetS, this study aimed to calculate a MetS score specific for the assessed children, using previously published methods,[9,13] as well as define a cutoff indicating higher risk of MetS in the sample.

Method

This is a cross-sectional study of a random sample of children aged 8 and 9 years, from public and private schools in urban and rural areas of the municipality of Viçosa, state of Minas Gerais, Brazil. This age group was chosen to investigate whether metabolic changes commonly observed in adolescence can already be observed, and possibly prevented, in the final stage of childhood. Data collection occurred in the years 2012 and 2013.

Sample size was calculated based on the total number of students enrolled in the 3rd and 4th grades of all the local schools (n=1297). For the calculation, we considered a 50% prevalence of MetS, as there is no consensus regarding its diagnostic criteria. By using a prevalence of 50%, the maximum sample number is guaranteed. A permissible error of 5% was considered, as well as a 95% confidence interval and sample loss of 20%, plus 10% for the multivariate analysis, resulting in an estimated sample of 385 children. The children were organized into a specific worksheet in alphabetical order and drawn using the "random" function in Microsoft Office Excel 2007 program.

The study exclusion criteria were history of cardiovascular disease and type 1 diabetes and/or use of hypotensive or lipid-lowering medications, in addition to the existence of incomplete data.