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ORIGINAL ARTICLE

Accuracy of different cutoff points of body mass index to identify overweight according to body fat values estimated by DEXA among Brazilian adolescents☆

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KEYWORDS
Sensitivity and specificity;
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Abstract
Objective: To evaluate the sensitivity and specificity of different cutoff points of body mass index for predicting overweight/obesity according to body fat values estimated by DEXA among Brazilian adolescents.
Methods: Cross-sectional study including 229 male adolescents aged 10–15 years, in which body adiposity and anthropometric measures were assessed. Nutritional status was classified by BMI according to cutoff points described in scientific literature.
Results: Moderate agreements were observed between body fat estimated by DEXA and cutoffs proposed by Cole et al. ($K = 0.61$), Conde and Monteiro ($K = 0.65$), Must et al. ($K = 0.61$) and WHO ($K = 0.63$). The BMI in continuous form showed good agreement with the Dexa (ICC = 0.72). The highest sensitivity was observed for cutoff by Conde and Monteiro (0.74 [0.62, 0.84]) and the highest specificity by Cole et al. (0.98 [0.94, 0.99]). For the areas under the ROC curve of cutoff points analyzed, significant difference comparing the cutoff points by Cole et al. and Conde and Monteiro (0.0449 [0.00294, 0.0927]) was observed.
Conclusions: The cutoff proposed by Conde and Monteiro was more sensitive in identifying overweight and obesity when compared to the reference method, and the cutoff proposed by Cole et al. presented the highest specificity for such outcomes.

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PALAVRAS-CHAVE
Sensibilidade e especificidade;
Saúde do adolescente;
Sobrepeso;
Obesidade;
Composição corporal

Precisão de diferentes pontos de corte do índice de massa corporal para identificar sobrepeso de acordo com valores de gordura corporal estimados por DEXA entre adolescentes brasileiros

Resumo

Objetivo: Avaliar a sensibilidade e a especificidade de diferentes pontos de corte do índice de massa corporal para o prognóstico de sobrepeso/obesidade de acordo com os valores de gordura corporal estimados por DEXA entre adolescentes brasileiros.

Métodos: Estudo transversal que inclui 229 adolescentes do sexo masculino com idade entre 10-15 anos, no qual foram avaliadas a adiposidade corporal e medidas antropométricas. A situação nutricional foi classificada pelo IMC de acordo com os pontos de corte descritos na literatura científica.

Resultados: Foram observadas concordâncias moderadas entre a gordura corporal estimada por DEXA e os cortes propostos por Cole et al. [$K = 0,61$], Conde e Monteiro [$K = 0,65$], Must et al. [$K = 0,61$] e a OMS [$K = 0,63$]. O IMC de forma contínua mostrou uma boa concordância com a Dexa [CCI = 0,72]. A maior sensibilidade foi observada em cortes por Conde e Monteiro [0,74 (0,62, 0,84)] e a maior especificidade por Cole et al. [0,98 (0,94, 0,99)]. Nas áreas abaixo da curva de ROC de pontos de corte analisados, foi observada uma diferença significativa ao comparar os pontos de corte de Cole et al. e Conde e Monteiro [0,0449 (0,00294, 0,0927)].

Conclusões: O corte proposto por Conde e Monteiro foi mais sensível na identificação de sobrepeso e obesidade em comparação ao método de referência, e o corte proposto por Cole et al. apresentou a maior especificidade para esses resultados.

Introduction

Obesity is a multifactorial disease whose increasing prevalence has been the focus of numerous investigations in both high-income[1,2] and middle-income countries[3] such as Brazil.[4] This fact is of increasing concern due to the high incidence of this disease in the pediatric population.[5]

In this context, different strategies to prevent and fight childhood obesity have been outlined in order to assess nutritional status[6,7] from body mass scores. Various methods, such as skinfold thickness, waist-hip ratio, waist circumference, and body mass index (BMI), can be used as nutritional status indicators.[8]

These anthropometric indicators have limitations in their measurements, but still show good predictive body fat values,[8] and findings in literature have indicated that BMI is an appropriate tool for cardiometabolic risk screening in the pediatric population,[9] although some differences point to other assessment methods as better body fat indicators.[10] BMI has become a useful tool because it is considered to be low cost and easy to apply, being widely used in epidemiological studies to diagnose excess body adiposity.[11]

There is no consensus in literature regarding the cut-offs to stratify BMI values into underweight, overweight, and obesity in the pediatric population; different cutoff points have been developed for this purpose.[12–15] This lack of consensus in cutoff points to classify the nutritional status of this population makes the comparison between studies conducted in different locations difficult, as with data from a single sample, different overweight and obesity prevalence can be found, depending on the cutoff point used.[16]

One of the techniques that are more precise than anthropometric measurements to estimate body fat and other body composition components is the dual energy X-ray absorptiometry (DEXA), which consists of ''scanning'' the body through X-rays that, after passing through the organism, are measured by an energy-discriminating detector. DEXA performs transverse analysis of the body and is a noninvasive technique considered safe that can measure three body components: fat mass, free fat mass, and bone mass.[17]

This study aimed to analyze the sensitivity and specificity of different BMI cutoff points for predicting overweight/obesity according to the body fat values estimated by DEXA among Brazilian male adolescents.

Methods

This descriptive/analytical cross-sectional study was conducted in a city in the state of São Paulo. This city has 210,000 inhabitants and is located in southeastern Brazil (human development index = 0.806). The sample consisted of 229 male adolescents participating in the university extension project in partnership with philanthropic institutions of that city. The following inclusion criteria were adopted: (i) informed consent form signed by parents or guardians; and (ii) age from 10 to 15 years at the assessment date. This study was approved by the Research Ethics Committee involving humans of the University responsible for this study.