



ORIGINAL ARTICLE

Impulse oscillometry and obesity in children ☆,☆☆

Maíra S. de Assumpção^a, José D. Ribeiro^a, Renata M.G. Wamosy^b,
Fernanda C.X.S. de Figueiredo^b, Paloma L.F. Parazzi^a, Camila I.S. Schivinski^{a,b,*}

^a Universidade Estadual de Campinas (Unicamp), Departamento de Pediatria, Campinas, SP, Brazil

^b Universidade do Estado de Santa Catarina (UDESC), Departamento de Fisioterapia, Florianópolis, SC, Brazil

Received 6 February 2017; accepted 27 June 2017

KEYWORDS

Children;
Obesity;
Oscillometry

Abstract

Objective: To compare impulse oscillometry system (IOS) parameters of normal-weight children with overweight and obese children.

Method: All participants were submitted to the evaluation of lung function (spirometry and impulse oscillometry) following the American Thoracic Society (ATS) standards. The evaluation of respiratory mechanics was performed using the Jaeger™ MasterScreen™ Impulse Oscillometry System (IOS) (Erich Jaeger, Germany), three tests were recorded, with acquisition for at least 20 s.

Results: The study included 81 children (30 in the CG, 21 in the OWG, and 30 in the OG), matched for age and sex. Regarding spirometry data, OG showed higher numerical values in relation to the CG; however, there were no significant differences among the three groups. For impulse oscillometry parameters, there was a difference between CG and OG for respiratory impedance (Z5) ($p=0.036$), resistance at 5 hertz (R5) ($p=0.026$), resonant frequency (Fres) ($p=0.029$), and reactance area (AX) ($p=0.014$). For the parameters expressed in percentage of predicted, there were differences in resistance at 5 hertz (R5%), resonant frequency (Fres%), and reactance area (AX%) between CG and OG.

Conclusions: Obese children showed increased oscillometry parameters values representative of airway obstruction, compared to normal-weight children. Changes in some oscillometry parameters can already be observed in overweight school-aged children.

© 2017 Sociedade Brasileira de Pediatria. Published by Elsevier Editora Ltda. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

☆ Please cite this article as: Assumpção MS, Ribeiro JD, Wamosy RM, Figueiredo FC, Parazzi PL, Schivinski CI. Impulse oscillometry and obesity in children. J Pediatr (Rio J). 2017. <http://dx.doi.org/10.1016/j.jpmed.2017.06.007>

☆☆ Study conducted at Universidade Estadual de Campinas (UNICAMP), Faculdade de Ciências Médicas, Departamento de Pediatria, Campinas, SP; and Universidade do Estado de Santa Catarina (UDESC), Departamento de Fisioterapia, Centro de Ciências da Saúde e do Esporte (CEFID), Florianópolis, SC, Brazil.

* Corresponding author.

E-mail: cacaiss@yahoo.com.br (C.I. Schivinski).

<http://dx.doi.org/10.1016/j.jpmed.2017.06.007>

0021-7557/© 2017 Sociedade Brasileira de Pediatria. Published by Elsevier Editora Ltda. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

PALAVRAS-CHAVE

Crianças;
Obesidade;
Oscilometria

Oscilometria de impulso e obesidade em crianças**Resumo**

Objetivo: Comparar parâmetros do Sistema de Oscilometria de Impulso (IOS) de crianças com peso normal com crianças com sobrepeso e obesas.

Método: Todos os participantes foram submetidos à avaliação de mecanismos respiratórios utilizando o Sistema de Oscilometria de Impulso (IOS) Jaeger™ (MasterScreen™ IOS, Erich Jaeger, Alemanha) seguindo as normas da Sociedade Torácica Americana (ATS). Todos os participantes foram submetidos a testes de espirometria e oscilometria (três testes foram registrados, com coleta de dados por pelo menos 20 segundos). A amostra foi dividida em grupos, a saber, grupo sobrepeso (GS) e grupo obeso (GO) e um grupo de controle com indivíduos com peso normal (GC), de acordo com a classificação da Organização Mundial de Saúde.

Resultados: O estudo incluiu 81 crianças (30 no GC, 21 no GS e 30 no GO), pareadas por idade e sexo. No que diz respeito a dados de espirometria, o GO mostrou valores numéricos mais elevados; contudo, não houve diferenças significativas entre os três grupos. No que diz respeito a parâmetros do IOS, houve diferença entre o GC e o GO em Z5 ($p = 0,036$), R5 ($p = 0,026$), Fres ($p = 0,029$) e AX ($p = 0,014$). Nos parâmetros expressos em percentual previsto, houve diferenças em R5%, Fres% e AX% entre o GC e o GO.

Conclusões: Crianças obesas mostraram parâmetros de oscilometria aumentados representativos de obstrução das vias aéreas em comparação a crianças com peso normal. As alterações em alguns parâmetros oscilométricos já podem ser observadas em crianças com sobrepeso em idade escolar.

© 2017 Sociedade Brasileira de Pediatria. Publicado por Elsevier Editora Ltda. Este é um artigo Open Access sob uma licença CC BY-NC-ND (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

The rapid increase of prevalence of obesity in children has led to the current global epidemic.¹ In Brazil, the prevalence of obesity among children and adolescents increased from 3.2% in 1989 to 14.2% in 2008, according to the Ministry of Health and the Brazilian Institute of Geography and Statistics. In the population aged 2–19 years, the rate of obesity reaches 15.4% in the Southeast, 4.3% in the Northeast, 5.3% in the Midwest, 10.4% in the South, demonstrating the high prevalence of obesity in Brazilian children and adolescents.²

It is well established that obesity causes metabolic changes, such as dyslipidemia, hypertension, and glucose intolerance, and is also considered a risk factor for diabetes mellitus type 2 and cardiovascular and respiratory diseases, including asthma.^{3,4} This evidence has been more commonly reported in the adult population. Therefore, high prevalence of obesity justifies the investigation of respiratory function in children and adolescents.^{5,6} Almost all studies use spirometry as a tool for this assessment.^{7–9}

The effects of obesity on the respiratory system are numerous. Lower complacency with consequent increased respiratory effort, derived from abdominal fat and thoracic accumulation, are often observed.¹⁰ This accumulation also changes the balance of power between the chest/abdominal wall and lungs, resulting in decreased functional residual capacity (FRC).^{11,12} Such factors can act on the reduction of the diameter of the peripheral airways, as well as on the increase of respiratory system resistance in obese individuals. Furthermore, increasing circulating levels of leptin are associated with reduced airway caliber and predisposition to increased bronchial hyperresponsiveness, which justifies the

assessment relevance and specific follow-up on central and peripheral airways of these individuals.^{6,13}

Monitoring the behavior of central and peripheral airways in this population is quite important; however, it is difficult to assess more distal airways through traditional tests, such as spirometry, which can assess normality of forced expiratory volume in one second (FEV₁) and vital capacity (VC), due to their large cross-sectional area and minimum contribution to the total airways resistance.^{14–16}

An impulse oscillometry system (IOS) is a tool used for more detailed evaluation. This is a non-invasive and effort-independent method to measure mechanical respiratory parameters.^{14,17} The application of pressure pulses at multiple frequencies allows the measurement of impedance (Z), resonant frequency (Fres), resistance (R), and reactance (X) and reactance area (AX) of the respiratory system, in available frequency variations.^{15,18} It involves rapid and reproducible measurements,¹⁹ allowing more sensitive identification of dysfunctions in the distal airways in cases of overweight and obesity.

In this context, the aim of this study was to compare the IOS parameters of normal-weight children with overweight and obese children.

Methods

This was a cross-sectional, analytical, and comparative study with normal-weight, overweight and obese children, aged between 6 and 14, attending educational institutions in Florianópolis (Santa Catarina/Brazil). Data collection was conducted at public and private schools from October 2012 to May 2014. This study was approved by the Research

Download English Version:

<https://daneshyari.com/en/article/8809669>

Download Persian Version:

<https://daneshyari.com/article/8809669>

[Daneshyari.com](https://daneshyari.com)